TELECONFERENCE '83

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FOREWORD

Teleconference '83 was Canada's first comprehensive conference on audio, graphic, computer and video teleconferencing. Over 250 people attended from across the country, representing business, government, education, health care associations and even the arts. Over 40 users, suppliers and consultants made presentations on various aspects of teleconferencing, during the general session and 12 workshop sessions. There were a dozen exhibits and several live demonstrations of various teleconferencing technologies. The event was sponsored and organized by Ontario's Transportation Energy Management Program (TEMP), a joint program of the Ministries of Energy and of Transportation and Communications, in co-operation with the Canadian Industrial Communications Assembly (CICA), the Ontario Ministry of Health, and Humber College.

Because the material presented at the conference will be of interest to a wide audience, the TEMP Teleconferencing Task Force has prepared these Teleconference '83 Proceedings. Many conference proceedings actually precede the event: they are papers prepared prior to the actual conference. These proceedings, on the other hand, mostly comprise edited transcripts of oral presentations delivered, and tape-recorded, during the General Session. (There is one regrettable omission, due to technical failure in the recording system: the talk given by Mr. Gary McKoen, Vice President, Adcom Electronics.) Workshop sessions were not taped; therefore the only workshops represented here are those for which formally prepared papers were submitted.

As much of the information presented during the conference does not appear elsewhere, we expect that this collection will prove valuable, offering a variety of perspectives on the subject from both users' and suppliers' points of view.

CONFERENCE PROGRAM

DAY ONE: GENERAL SESSION

Monday, June 20, 1983

Opening	Glenn R. Thompson Deputy Minister of Energy *
Overview of Teleconferencing	Wendy Cukier, Project Leader, TEMP Teleconferencing Task Force, Ontario Government
Audio Only	Brad Haines, Product Manager, Teleconferencing, TransCanada Telephone System
Tele-education Applications	Dr. Donald McDonell, University of Ottawa
Business Application	R. G. Aldcroft, Director, Branch Administration and Sales Services, 3M
Telehealth Applications	Judy Roberts, Co-ordinator, Joint Telecommunications Project, Royal College of Physicians & Surgeons
Computer Conferencing	Dr. Ric Irving, Director, Centre for the Evaluation of Communications and Information Technology, University of Waterloo
The Future of Teleconferencing [Keynote]	Doug Sloane, President, TransCanada Telephone System
Electronic Graphics and Freeze-Frame Video	Jim Baker, Market Planning Specialist, New Brunswick Telephone
User Perspective	Howard Macumber, Manager of Engineering, Government Telecommunications Agency, Department of Communications
Telehealth Application	Dr. Earl Dunn, Sunnybrook Medical Centre
Full-Motion Video Teleconferencing	Gary McKoen, Vice President, Adcom Electronics
Demonstration with Montreal	John Murphy & Jacques Kirouac, Bell Canada
Business Applications	Ed Pryzdial, Advisory Analyst, IBM Canada
Ontario Government Applications	Neeru Biswas, Supervisor, Systems Development, Ministry of Government Services
Point-to-Multi-Point Applications	Larry Steinman, President, Canadian Teleconference Network

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* Mr. Thompson has since been appointed Deputy Minister of the Ministry of Government Services, Ontario.

DAY TWO: WORKSHOPS

Tuesday, June 21, 1983

101 Audio Bridges
Jerome Powers, Darome Canada
Mark Michalak, Rockwell/Wescom Canada
Brad Haines, TransCanada Telephone System
Paul Strudwick, Bell-Northern Research
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102 Audio Terminals
Dr. Radamis Botros, Darome Canada
Don Whitred, Northern Telecom
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103 Electronic Graphics
Jim Baker, New Brunswick Telephone
Louise Roberge, Bell Canada
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104 Full-Motion Video
Gary McKoen, Adcom Electronics
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Bill Dinwoody, Royal Bank of Canada
Chaired by: Glen Chung Yan, Ministry of Government Services

105 Freeze-Frame Video
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Bob Griffith, Kelcee & Assoc.
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107 User Training
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Judy Roberts, Royal College of Physicians and Surgeons
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Dr. Barry Ellis, University of Calgary
Dr. Mark Waldron, University of Guelph
Dr. R. Williston, Red Deer College
Chaired by: Stewart Hall, Humber College

110 Business Applications
R. G. Aldcroft, 3M Canada
Gordon Lewis, Polysar
Bill Dinwoody, Royal Bank
Chaired by: Wendy Cukier, TEMP Teleconferencing Task Force

111 Point-to-Multi-Point
Lydia Dotto, Canadian Science Writers Association
B. MacDonald, MacDonald & DeHemingborough
Chaired by: Larry Steinman, Canadian Teleconference Network

112 International Teleconferencing
Larry Jellen, Satellite Business Systems International
Wally Gribbins, COMSAT General
Ruth McCurdy, AT&T International
Chaired by: James J hnson, Teleglobe Canada

About the TEMP Teleconferencing Task Force

Since 1980, the TEMP Teleconferencing Task Force, a joint responsibility of Ontario's Ministries of Transportation and Communications, Energy, and Government Services, has been promoting the use of teleconferencing in the Ontario government and private sector. In addition to providing information and consultation on the subject, the group conducts research and assists suppliers in the development of new products and services. For more information on teleconferencing, contact:

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TELECONFERENCE '83

Glenn Thompson
Deputy Minister of Energy*
Ontario Government

I would like to begin by welcoming those of you from out of town. I understand we have visitors here today from across Canada, and some parts of the United States. I am pleased that this conference has attracted such a large and diverse group. I'm told that there is a healthy representation here from business, telecommunications, education, government, and health circles. This kind of mix is a clear indication of the large and widespread potential of the growing field of audio, video and computer teleconferencing.

Today and tomorrow, you'll have a chance to explore the latest applications of teleconferencing with users, suppliers, and professionals. You'll hear about the many uses of teleconferencing in business, education, government, and health. I know you'll be impressed with the wide variety of applications of teleconferencing in each of these fields.

I'd like to speak to you briefly on how the Ontario government fits into the teleconferencing picture in this province. The Ontario government began working with various teleconferencing systems in the early 1970s. At that time, it was used primarily to extend services and improve communications with remote parts of northern Ontario. As the government learned more about the capabilities of this technology, we began to use various forms of teleconferencing as a travel substitute in our operations. The Government of Ontario was extremely impressed with the benefits of teleconferencing, particularly in terms of time, money, and energy.

You'll hear about some of these savings at the conference. But I would like to share one example with you. In one 18-month period at the Ministry of Transportation and Communications, teleconferencing saved an estimated $50,000. More than 450 business trips were replaced. That saved more than 2,000 hours of management time, which is one year of work time for one person.

Realizing that the many advantages of teleconferencing were not widely known, the Ontario government set up a task force to promote this medium in 1980. The task force included representatives from the Ministries of Energy, Transportation and Communications, and Government Services. The task force quickly became an important part of the Ontario government's Transportation Energy Management Program. This program -- also known as TEMP -- is run by the Ministries of Energy and Transportation & Communications to promote energy savings in the transportation sector.

The task force first made its mark by providing information on the benefits and uses of teleconferencing to the private sector and to government. In addition, it assisted organizations in establishing teleconferencing programs and training users.

One of the main initiatives of the task force was to encourage Bell Canada to set up an in-house demonstration of teleconferencing. This demonstration was a great success. As a result, Bell Canada employees now use teleconferencing regularly themselves, and market its use.

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* Mr. Thompson has since been apointed Deputy Minister of the Ministry of Government Services, Ontario.

Now three years old, the task force has assisted a number of suppliers to develop and test new products -- products you'll see over the next two days.

As the Deputy Minister of Energy, I am particularly interested in the energy savings chalked up to teleconferencing. In Canada, it is estimated that travel to business meetings accounts for six percent of all automobile travel and more than half of all air travel. That's over 3.5 billion litres of fuel a year. I was interested to read the other day that George James, the senior vice-president of the Air Transport Association in the United States, predicts that teleconferencing could cut business travel by 3% by 1985 and 30% by 1990. Clearly, this would mean a huge cut in our energy bill, which has two main advantages: cost savings and energy conservation. Energy conservation continues to be a top priority at the Ministry of Energy.

Many of you may be wondering why I am standing here talking about energy conservation, when the newspapers are filled with stories about a world oil glut and sagging world oil prices. Energy conservation continues to be important, because there is no telling how long the current world oil situation will last. I believe the current world oil glut and sagging world prices are mere short-term phenomena. In the longer term, crude oil is going to be more expensive and less plentiful. After all, oil is a finite resource. It cannot last forever. The International Energy Agency is predicting that the world oil demand could be greater than the supply by the end of this decade.

We must also keep in mind that OPEC nations have about 65% of world oil reserves, and account for a fair chunk of world oil production. Another war or political upheaval in the volatile Middle East could send the world into another energy crisis.

In Canada, we have had to import oil for many years. Energy conservation has helped reduce our demand for oil, yet these efforts must continue if this country is to reach a sustained level of oil self-sufficiency. That is why energy conservation continues to have top priority at the Ministry of Energy.

Working with the Ministry of Transportation and Communications to promote teleconferencing in this province is an important part of our energy conservation strategy.

We are also working with various ministries to promote energy conservation and off-oil measures in Ontario's transportation sector, homes, industries, and public buildings. I am pleased that we are seeing most positive results from these many initiatives. In fact, just a few years ago -- in 1975 -- oil supplied about 50% of Ontario's total energy needs. Today that figure is down to about one-third. Fewer homes, industries, and offices are using oil to meet their energy needs.

Teleconferencing will help this province continue on the road to energy security. I am particularly delighted with the progress I have witnessed in the development and acceptance of teleconferencing in this province. I am convinced the momentum begun in the past several years will continue to grow. Your presence here today is a clear sign of the direction in which we are heading. Teleconference '83 is an ideal forum for all of us to share ideas, to discuss what we've learned about this exciting form of telecommunications, and to plan for the future.

In closing, I would like to thank Wendy Cukier and the rest of the teleconferencing task force for their fine efforts in organizing Teleconference '83. Humber College, the Ministry of Health, and the Canadian Industrial Communications Assembly are also to be commended for their support in pulling this conference together.

And I'd like to thank all of you -- the exhibitors, speakers, and participants -- for being here today. I see this conference as important in further building the community of teleconference users in Ontario and across the country. It will also no doubt contribute to the growing momentum of this burgeoning market.

Once again, I extend a warm welcome to you all, and best wishes for a most successful conference.

Thank you.

OVERVIEW OF TELECONFERENCING

Wendy Cukier
Project Leader
TEMP Teleconferencing Task Force
Ontario Government

John Naisbitt, author of Megatrends, has remarked that, "Teleconferencing is so rational, it will never work." This bit of futurist wit is borne out by the irony built into the conference we are now attending: on the one hand, we have in attendance at Teleconference '83 some 250 people who, we must assume, believe that teleconferencing can work; on the other hand, you all came in person -- we are not now conferencing electronically. Insofar as Naisbitt is suggesting that teleconferencing will never replace all travel, I can only agree. But this is not to deny its remarkable potential as a time and cost effective alternative to travel.

My remarks will focus on the possible applications of teleconferencing, particularly on an approach to its implementation. I hope this overview will help to provide a framework for what you learn today and tomorrow.

Let us begin with a definition: teleconferences are meetings involving three or more people in two or more locations, linked electronically. This includes meetings among individuals in several locations or groups in two or more locations but excludes a standard telephone call. Some authorities insist that the communication take place in real time, but I would not be so stringent.

The types of teleconferencing included are audio, audio plus visual support, computer and video teleconferencing.

Audio teleconferences use voice as the means of communication.

Computer conferencing involves the exchange of messages typed into terminals.

Audio plus visual support conferencing uses facsimile, word processors, electronic graphics or freeze frame video to support voice communication. These techniques can use the regular telephone network.

Finally, full motion video teleconferencing allows the exchange of moving pictures.

I have taken note of the fact that there is a broad representation from various sectors here. And, indeed, teleconferencing is now being used in business, government, health, education and associations in a variety of ways.

First business. The largest group attending today is from business. Teleconferencing is being used by business for virtually all types of meetings: administration, regional operations, project management, research and development, marketing, training and special events.

Here are just a few typical applications:

Air Canada executives meet coast to coast every single morning to review the company's operations.

Polysar uses teleconferencing internationally to co-ordinate production of petrochemicals. Gordon Lewis will be discussing Polysar's system tomorrow.

3M uses teleconferencing in their sales and marketing function. Roche Laboratories in the USA is another good example of how teleconferencing is used in marketing -- customer training seminars are held between as many as 100 locations via audio conference to introduce new products.

Even engineering design has been done via teleconference. Engineers at Ford Motor Company (USA) met with colleagues in Germany and England using freeze frame technology to discuss design problems.

Many of the major banks in Canada are using teleconferencing -- the Royal Bank uses their system to discuss development projects between Montreal and Toronto.

IBM both in Canada and the USA also uses teleconferencing regularly -- Ed Pryzdial will tell you how.

Finally, a number of companies are using teleconferencing for 'special events'. Ford Motor Canada, for example, introduced its 1983 product line to 6 sites across the country via video conference. Virtually all industries and all functional areas of business are represented among users.

A study TEMP recently conducted indicated that almost three quarters of large Ontario companies are using some form of teleconferencing. These users reported the following benefits:

Saves time	46%
Saves money	22%
Lets more staff participate	12%
Improves efficiency	7%
Don't know	13%

In government the applications are very similar; teleconferencing is used for: committee meetings, co-ordination of regional operations, intergovernmental task forces, delivery of services, interviews, training, special events and press conferences.

For example, the Ontario Ministry of Environment holds weekly meetings among its regional directors and estimates that it has reduced travel by 30% using teleconferencing. Educational seminars, and training programs have been developed to take advantage of the medium. Even personnel interviews have been conducted. In Ontario, where resources tend to be concentrated in the south, teleconferencing has been used to improve access to government

services. The Premier and other ministers have used video conferencing for special events such as the opening of some of Ontario's technology centers. Both audio and video have been used for press conferences. The former Minister of Environment 'met' with the press in Sudbury several minutes before he met with the press in Toronto concerning a major announcement on Inco. In short, teleconferencing has been used both to replace conventional meetings and extend services.

At the Ministry of Transportation and Communications, usage was carefully monitored. Over 18 months, $50,000 and over 2,070 hours of management time were saved. Users cited other benefits too: improved co-ordination, increased participation and productivity.

Today you will hear from both Judy Roberts and Earl Dunn on the applications of teleconferencing to telehealth. It has been used for patient care -- diagnosis, consultation, even treatment -- for professional and public health education and for administration.

Teleconferencing has also been used in education, for the delivery of courses (continuing education, professional development, credit and non-credit), for enrichment (to bring guest spearkers into classrooms) and again for administration. The University of Quebec has used teleconferencing to manage its decentralized campus for many years.

Finally, associations which are dependent on voluntary memberships and are experiencing budget constraints, teleconferencing is used for training and educational programs, for committee meetings and for special events.

I spoke earlier of an approach to teleconferencing implementation. Basically, I see the introduction of teleconferencing in an organization as a multi-step process, running as follows:

1) Assess Feasbility
2) Obtain Senior Management Support
3) Assess Needs
4) Design System
5) Develop Administration
6) Train
7) Promote
8) Evaluate

You are going to see a lot of technology at this conference, but the main point I want to make is that selection of a particular technology is only one step in introducing teleconferencing. Attention to these other issues is, I feel, critical.

First, what is in it for your organization? What are your objectives? What are the costs and benefits?

Teleconferencing can reduce travel, it can also improve communications, extend services, and fulfill other needs for status, or leadership. You must take a hard look at what you want to achieve. There is no right or wrong approach but clearly the $25,000 full motion system of the Ontario Government was designed to meet certain objectives, the $750,000 system of Atlantic Richfield to meet others.

Let me say a bit about travel substitution. The Ontario Government's TEMP Teleconferencing Task Force was established in 1980 to promote teleconferencing in order to reduce travel. Studies had suggested that over half of all face-to-face meetings could be replaced with teleconferencing, 40% with audio and an additional 10% with video.

Operational studies have documented impressive savings. Boeing in the USA 'saved' almost 1 million miles of travel over a thirty month period. Control Data reduced its travel budget 10% with teleconferencing.

Our recent survey indicated in some large companies teleconferencing is perceived as having reduced travel substantially (20%) and is expected to replace future trips.

Perceptions of Travel Substitution

Teleconferencing Has:	For % of Users
Decreased Business Travel	23%
Increased Business Travel	2%
Had No Effect	68%
Don't Know	7%

Percentage of Trips Replaced

Number of Trips	Total Users
1 - 14	24%
15 - 29	19%
30+	18%
Don't know	39%

Percentage of Future Trips Which Will Be Replaced

Number of Trips	Users	Non-users
None	9%	90%
1 - 14	19%	1%
15 - 29	18%	1%
30+	21%	5%
Don't Know	34%	4%

If travel substitution is an objective, be careful how you define it. Will your travel budget actually show a reduction or do you merely expect growth in travel to be curtailed? There is an important distinction between travel reduction and travel avoidance.

Likewise, if improved communications is what you are seeking, how will it be manifested? More meetings? More service? Better decisions? Improved process? More clients (students/patients) served? Better quality? Your objectives must be defined, even if the project's aim is only to generate information about teleconferencing.

What are the tradeoffs? Consider the costs of the system, the extra staff time required, the effect on quality of service. Try at least to identify what you may not be able to quantify.

Senior management support can help whether you are in business, government, education or health. Sometimes senior administrators have a broader perspective on what's good for the organization or institution and their support can be essential in promoting teleconferencing.

Above all, the system must meet the needs of the users. A cliche perhaps but true. Whether you embark on a formal or an informal study you must consider who is going to use the system and what they're going to use it for. Attitudes to travel and teleconferencing, travel links and meeting behavior should be examined.

Because we were interested in replacing travel it was important to examine travel patterns. We found 1/3 of travel at MTC was between head and regional offices, the rest was more diffuse. Two systems were needed: high quality links in heavy travel corridors, and a widely accessible, flexible system for the more diffuse travel.

MTC Travel Records Survey

Link	Travel $	% of travel
regional offices to Toronto	135,000	34%
offices within Toronto	25,000	6%
other	240,000	60%

Also, because teleconferencing was new, we needed to assess attitudes to it and travel. We got something of a surprise -- not exactly a receptive audience. Most people thought the amount of travel they did was about right. A few thought less would be better, but 21% wanted more.

Perception of Travel Desirability

Travel desired	% of travelling staff
Want less	9%
Want no change	70%
Want more	21%

Still, while this wasn't encouraging, we did know what we were up against and realized that a great deal of internal promotion of the concept would be required.

What are they going to use the system for? How do they usually operate? If visual support is required, what will they be most comfortable with? Some teachers will only use blackboards. Some managers use only overhead foils. You must define minimum requirements. The choice of a moped or a cadillac may be made on the basis of other factors.

You are going to hear a great deal today about the technology. I don't want to say much except: don't get oversold! The most elaborate state-of-the-art wizardry can go unused if it doesn't meet the needs of the users. Many American companies started out big and ended up downgrading to simpler technologies.

On-site co-ordinators are essential for some systems although new positions need not be created. Knowledgeable co-ordinators who book the facilities, trouble shoot, train users and handle problems are especially important if you expect a large number of occasional users.

Users must be trained not just on how to use the technology, but how to teleconference. Advance preparation is important for business meetings and for tele-courses. If audio is used, materials must be prepared and distributed well in advance. Format or presentation style may need to be reconsidered. Protocol is essential in audio teleconferences where there are no visual cues. The importance of training cannot be overemphasized. Ideally, a variety of training options should be available. Hands-on experience is an essential.

To be successful, teleconferencing must be viewed as a regular tool rather than a gimmick. The amount of promotion required depends on the specific organization. Fortunately, teleconferencing tends to be habit forming. Chances are, if you can get someone to use it a few times, they will continue. Again, various techniques can be used - - presentations, printed materials, articles in newsletters, senior management directives, word of mouth. Usually in every organization there will appear a handful of enthusiastic users or advocates but they may need supporting materials.

If you have established objectives and are accountable for what you do, it is a good idea to build in evaluation procedures. Users will resist, especially if forms are involved, but it may be worth your while to devote some effort to chasing down the information. It also enables you to identify problems if they arise.

AUDIO TELECONFERENCING

Brad Haines
Product Manager
TransCanada Telephone System
[now: Telecom Canada]

Teleconferencing can be defined as a group communication service used to interconnect three or more people at two or more locations. This definition encompasses the whole range of teleconferencing services, from point-to-point group communications through point-to-multi-point or large multi-point conference calls. Here, audio-only teleconferencing will be reviewed. These systems consist mainly of the terminal hardware used, the bridging apparatus and the network facilities that are available.

The most common terminal used in audio teleconferencing is the regular telephone hand-set or, if more privacy is needed, the telephone headset. To facilitate larger groups, a variety of group audio terminals is available. For example, push-to-talk audio terminals incorporate a uni-directional microphone which has a limited pick-up range and is activated either by pushing a bar or flipping a switch. The main benefit of a push-to-talk terminal is that it reduces the room/noise interference. A participant remains in a listening mode unless the bar is depressed or pushed to talk. Most of the push-to-talk terminals on the market today are portable and have universal application, being used extensively in the educational field, as well as for business applications. The Darome Convener family of audio conferencing terminals is one example of a push-to-talk terminal.

Alternately, there are 'hands-free' terminals. Each incorporates an omni-directional microphone which is an open-microphone concept with a pick-up range much wider than on the uni-directional microphones. Because they have an open microphone, they are usually voice-switched, meaning that the loudest sound captures the communication channel. It should be stressed, as Trans Canada does, that when these microphones are being used, the parties in the listening mode should mute their microphones at those locations, thereby preventing any noise from disturbing the conference. 'Hands-free' terminals, by and large, have been designed for business applications.

Examples of hands-free terminals include the Logic hands-free terminal, the Companion hands-free set, the 50A Set and Northern Telecom's Conference 2000 unit. The Logic hands-free terminal has an off-and-on switch, volume control, and muting button. The Companion hands-free set is the same as the Logic series, except that it's connected to nonlogic type telephone sets. Otherwise it has the same controls. These two pieces of equipment are used for desk-to-desk conferencing and are suited for groups of one to four people. This type of terminal is not recommended for a meeting room application.

The 50A Set incorporates not only an internal microphone, but external microphones as well. Northern Telecom's Conference 2000 unit has an omni-directional microphone in the bottom part of the unit and a loud-speaking device in the top part of the unit. What looks like a Logic hands-free unit is actually the control panel with the muting capability. The Conference 2000 unit also has the capability of being hooked to a mixer module which allows

the interconnection with external microphones. Conference 2000 is suitable for an eight to twelve person gathering; that is, for larger groups in a conference room to conference room approach.

One of the newest microphones on the market is the Quorum audio terminal produced by Western Electric in the United States. In the Quorum, there are actually twenty-eight microphones arranged in a linear array. The loud-speaker is attached to the bottom of the base. The pick-up range of the Quorum microphone is very good, and again has been designed for meeting room applications.

This, then, is a brief description of the terminal hardware component of the audio teleconferencing systems. The next aspect to consider is audio bridging. Bridging methods can be divided into two modes; dial-up or dialing-out bridging and meet-me or dialing-in bridging. With dialing-out, the originator or the bridge operator actually dials out from a central point and bridges everybody together. Conversely, with dialing-in or meet-me conferencing, the chairperson and all meeting participants dial into a central bridging point.

There are numerous types of bridges available; what follows is certainly not an exhaustive list. They range from add-on, or three-way calling, right through to customer premise bridges. Three-way calling is as simple as adding a third party to your call. It is available on many key telephone sets, as well as on a lot of the PBXs, or private branch exchanges, on the market today. In addition, many of the PBXs have their own conferencing capabilities.

Another form of bridging is the Conference 100 service, which is a telephone company based conferencing service. This is a new name for the old service called "operator handled" conference calls. The chairperson calls the operator and gives him/her the name and numbers of the participants he/she wants to reach. Then the operator dials out, contacts each person and connects him/her to the bridge. The port capacity varies across the country, but if the call were bridged in Toronto there could be a maximum of fifty stations. The charges for this type of service are billed totally to the call originator or chairperson. They include both person-to-person charges for the long distance links, as well as a usage sensitive bridge charge.

Conference 200 is defined as an operator assisted meet-me service, similar to the Conference 100 service except that you dial into the meeting and the operator manually plugs you into the conference. Right now, it's a Bell Canada offering but the other member companies of TCTS are evaluating the service concept. In Toronto, there is a maximum of 24 stations and in Montreal and Ottawa the maximum is 20 stations. Again there's a usage sensitive bridge charge billed to the call originator, however, with this service each participant is responsible for his/her own long distance charges into the bridge.

Conference 300 is defined as a customer-dedicated automated meet-me service. It consists of a micro-processor based bridge dedicated to a particular customer and located in a telephone company central office. In size, it resembles a microwave oven and it has been designed to be rack-mounted in a

telephone company central office. Because it is micro-processor based, there are a number of special features that are available through touch-tone access; for example, dialing out capabilities, the ability to lock-out or unlock the bridge, and the ability to have a station count to reveal how many people are on the line.

There are numerous manufacturers making customer premise bridges; many of them are U.S. based. These bridges can be automated, or operator or attendant assisted, or even both.

Most of the bridges on the market today incorporate automatic gain control or level equalization. They have the ability to control or monitor, on a port by port basis, the incoming signal. The Darome 20/20 Bridge, for example, has a control function on each of the twenty ports which can input gain as well as equalize the levels on all the ports. It provides very good audio quality and is being used at the University of Calgary as well as at the Royal College of Physicians in Toronto. Most of the customer premise bridges are acquired on an outright purchase basis.

In terms of network alternatives, there are two available modes: the regular DDD type or public-switched network, and dedicated facilities. What is involved is a two-wire versus a four-wire approach to conferencing. With two-wire transmission, the talking and listening path are on the same pair of wires. A four-wire transmission has separate paths for listening and talking. Each type has is own advantages and disadvantages. The four-wire transmission gives you better audio quality; however, the two-wire system gives you flexibility of location. Two-wire systems are universally available, provided as a network already in place, and offered on a 'pay-as-you-go' arrangement. This system can be used whenever it is needed, but because it is two-wire only one party can talk at a time. Four-wire, as previously mentioned, has a better quality of transmission because there are separated paths. Unfortunately, special equipment is usually required as the facilities are dedicated. Four-wire systems usually require less set-up time as the equipment is there whenever someone wants to use it.

Finally, the important thing to remember when implementing a teleconferencing system is to base it on your needs not your wants. Although most people start off wanting full-motion video, an analysis of their need shows that they really need somewhat less than that. The system should be kept simple and flexible. Starting off with a cadillac when a compact will do is not recommended. Build upon what is needed.

Furthermore, the importance of training cannot be over-emphasized. TCTS deals with many executives across Canada and they all need that initial training required to make teleconferencing a success. Concentration should be on the benefits, not on the technology of the systems.

Using the latest in satellite technology will not provide any benefits unless it is satisfying the needs of the user. The technology should be transparent to the user. In conclusion, it should be stressed that it is satisfaction of needs that counts.

TELECONFERENCING AND EDUCATION AT THE UNIVERSITY OF OTTAWA

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There are a number of problems related to distance education that preoccupy the University of Ottawa, and probably many of the other universities and colleges as well. Several new and exciting programs in this field are starting at the University of Ottawa this year and they are possible only because of tele-education or teleconferencing.

It is a long standing tradition in Canadian universities and colleges to offer courses at the off-campus centres, situated one hundred, two hundred or even three hundred miles from the main campus. Some of these courses have been taught primarily by on-campus people who travel out to these centres, and some have been taught by local specialists. For years, it was a common sight to see a professor with an overloaded bag of books heading off to the small communities that were patiently awaiting their week's supply of culture. I've done that many times myself, carrying philosophy to numerous waiting participants.

For many years, the clientele in the off-campus centres was largely made up of school teachers looking to obtain a BA Degree, or at least to up-grade their standing. However, over the past five or ten years, a radical change in clientele has taken place. It became much more diverse, and with this change came a need for a wider variety of courses and more specialized ones. However, in each specialized or higher-level course, there were fewer students. This was a problem, as was the fact that, for many of the new courses that were in demand, there were no professors available to travel. The increasing demand by the universities and colleges that the professors do more research, meant that fewer and fewer professors were willing to take time out of their research to travel to the smaller communities. It was with the idea of maintaining the commitment to the off-campus communities, despite all of these problems, that the universities and colleges turned to tele-education, or teleconferencing, as a means of bringing the classroom lecture to the off-campus students. In addition, more and more of the students were working and had no time to come to the regular classroom sessions.

The simplest form of tele-education is the common telephone line, with a set of microphones and a loud-speaker at either end. If a bridge is introduced into this system, then five, ten or twenty communities can be linked together at one time, with one professor teaching all these students simultaneously. Instead of the professors travelling hundreds of miles to teach ten students in a small community, they can link into a classroom on campus, walk up to a microphone and teach one hundred to one hundred and fifty students in five or ten different communities.

With this basic audio system, one can use all the traditional graphics that are available. For example, overheads can be used very easily. They simply need to be duplicated and sent out to the various communities. Also slides, videotapes and films can be used in this way. Many courses, although not all, can be taught very successfully, simply using audio conferencing and some of the graphics. The majority of students taught in this way, at least at the University of Ottawa, say they found it much better than they expected. The first thing to do with the students is to make them stick with the course for two or three weeks, so that they can discover what an effective method of teaching it is. This basic form of audio conferencing is being used in practically all provinces of Canada. At the moment, there are 17 universities and colleges across Canada using it; about 97 post-secondary courses are being taught via teleconferencing.

One of the important benefits of teleconferencing to the universities and colleges is that it allows for real time interaction between the professor and the students. This is an important consideration for off-campus students; they constantly ask if they are going to be able to talk with the professor. Even if many of them will not use this possibility, they all insist that it be there. If someone, for example in Barry's Bay, does ask a question, it benefits everyone and helps create classroom atmosphere all along the network. The strangest thing of all is that when professors travel to these centres, the students don't ask any more questions than they do when they are using the teleconferencing system. What they're really interested in is being able to interact and this is a great benefit of audio teleconferencing.

The second benefit, in the educational system, is the access it gives to the specialist. The university has found that it can get some of its best professors to teach on this system, whereas many of them would not travel out to the different centres because of a lack of time. If they went to one of the communities, they wouldn't go to the others. Without teleconferencing, therefore, it would be impossible to have the specialist offer the course to all those centres. We had that experience this year with a course in special education. Three communities had asked for it, but there was only one professor available to do the course. They weren't well enough informed of what we were doing on campus to know that it was possible to link up all those communities and give the course to all three at one time. As a result, only one of the communities had the opportunity to take advantage of the course and the other two communities did not get it at all.

The system is cost effective and time effective for the students as well as for the professor. The students have written to us to say that they hope the system will continue, that it's not just an experiment, because they find it very convenient. Many are working people, mostly parents, who have to go home after work, prepare supper, take care of the children and then drive possibly sixty or seventy miles to take a course given in one of the centres. They have pointed out that they can use those three to four hours driving time in a much better way. The system reduces travel time and cost for the professor, but it also saves time and cost for many students.

Because the system is cost effective, it becomes possible to offer courses to a much smaller group of students than would otherwise be possible. For

example, in a city like Cornwall, which is about seventy miles from the main campus in Ottawa, if we sent a professor to give the course, it would cost us $5,018 - $4,200 for the professor's salary, and the rest for travel. If we offered the same course by teleconferencing, it would cost us only $1,797. If you take tuition fees at approximately $200, then we need about twenty-five students in Cornwall in order to send a professor out. If we do it via teleconferencing, we can do it with about nine students.

In the case of a multi-point course, where we wish to reach five or six centres all within about a hundred mile radius, we can sometimes accommodate centres which have only three or four students. Provided that there are enough students in the other centres, the total income of the network can carry centres which have fewer students. This is a great breakthrough for us and, I am sure, for many universities and colleges. We can offer courses to the small communities when they ask for them. Imagine what this means, for example, to those who are close to completing a degree. There is one course they need at a fourth year level and yet there are only three or four of them in the community. They are all working and therefore unable to come to the university. It would be impossible to send a professor out for three or four students. Teleconferencing, then, is certainly a help for those small communities and a saving for the university.

The other thing that it does for us is that it prevents the cancellation of a lot of courses. Nothing is more frustrating to a group of students, to a professor and to the administration at the university, than to set up a course and then find that there are not enough people up in Barry's Bay, or wherever, to give the course. This means it has to be cancelled after the first night. The students have planned their season to take the course, they have arranged their schedule to accommodate it, the professor has arranged to be free at that time, and then the course has to be cancelled. Cancellations cause a lot of trouble. So far, the system has prevented this from happening. Also, a much wider selection of courses can be offered because specialized courses can now be offered to smaller groups of students and more professors are willing to participate in the teleconferencing system than were previously willing to travel.

Another advantage of the system is its flexibility. Telecom Canada has made it possible to go into almost any community or town across the country. All the schools that we work in have phone systems. The only piece of technology that has to be installed in the classroom is a phone jack, and that's very simple. This means that we don't have to make a large investment in any one community. If a particular community wants a course, we simply put in a phone jack in order to offer the course in that community. If, in the next semester, they no longer need the course, or have enough students for courses, we just pick up our set of microphones and box and move on to another community. The low investment adds to the flexibility of the systems.

Once the decision has been taken by a university or college to go into tele-education, a choice has to be made because there are two ways to set up and design the system. The first is to use the technology to extend the on-campus lecture to the off-campus communities. The second is to set up a

parallel, or duplicate, set of courses exclusively for the off-campus communities. There are pros and cons for both of these settings. The greatest benefit of the first setting is the visual feedback for the professor who is able to lecture more naturally because of the personal contact with the students. It is difficult to deliver a talk or lecture without an audience. What we are doing is asking our professors to be radio or TV announcers, able to talk to an absent group spontaneously. While a lot of our professors can do this, it is much easier for them if the group is actually present. Student presence is one of the greatest advantages of the first setting. Another one is that academic quality is uniform, both on and off campus. Once in a while, the off-campus students complain that we don't send the top-rate professors to the off-campus communities. In some cases it's true because often the best professors won't travel. One of the benefits of teleconferencing from the classroom is that the university knows that the off-campus communities are getting the same quality of courses as the on-campus community.

This setting certainly has great financial advantages because the professor is not required to give the same course a second time, which means we don't have to pay a stipend to the professor. If it's over and above the normal teaching load, then we would have to pay the professor another $5,000 to teach the course a second time and some professors would not have the time to do it.

The first setting, then, is time effective and cost effective. However, there are disadvantages. They appear when we have large numbers in the classroom, for two reasons. Technically, it is difficult to get sufficient microphones for everyone and still maintain the natural atmosphere of a classroom. If you ask students to go to a microphone to ask questions, they just won't do it. This particular problem, however, can be solved, to a certain extent. We tried by setting up a classroom with one microphone for every three students. The students very quickly got used to reaching out and using the microphone.

The other disadvantage is that it is very difficult for the professor to concentrate on the large number of students in front of him or her, and at the same time concentrate on perhaps another hundred students in the off-campus centres.

In the second system that I mentioned, the professor would be teaching the course only for the off-campus centres. The advantage of this is that the professor is concentrating completely on these centres and doesn't have to share his energies with the group in the classroom. The disadvantages of this system are all the same factors that are advantages in the first setting -- there is no visual feedback for the professor and the academic quality is not uniform because the same professor may not teach both courses. It is also more costly, both in time and money.

Therefore, anyone thinking of going into teleconferencing at the university or college level has to think seriously as to whether they want to set up a system that is going to take on-campus lectures and transfer them to the off-campus community, or whether they want to set up a parallel system. It has been suggested that offering the courses live from the classroom is going to accentuate or continue the isolation syndrome of the off-campus

groups, that they're going to feel that no special attention is paid to them. So far, we've found the contrary: our students are happy to be part of the on-campus community, even though they are doing it via teleconferencing.

Whether you choose to teach from a classroom setting, or from the off-campus centres, the choice in system design appears when graphics are required. If real time graphics are necessary what type of graphics are you going to choose?

The University of Ottawa decided that all courses would be given from a live classroom setting. Therefore, in choosing the system of real time graphics, it was important to find something that would not disturb the classroom setting. Otherwise, the professor could become annoyed and decide not to teach the course again, or the students on campus might be frustrated and might complain that they don't like their courses being siphoned off to other communities. What we did, therefore, following the example of the University of Illinois, was to set up electronic blackboards, which we will be using for the first time in September 1983 for our science courses.

The electronic blackboard is a wonderful piece of equipment. It looks like an ordinary portable blackboard, but it has a pressure-sensitive screen. When you write on this screen with a piece of chalk, the signal goes down a telephone line and is converted to a video signal at the other end. The students off campus, in those five or six communities, instantly see everything the professor is writing. If the professor wipes something off the blackboard, it wipes off the screen at the other end as well. If we set up two or three of these blackboards in the classroom, the situation there does not seem different to what it is normally. The professor wears a microphone and teaches the course using the blackboard as usual. The students don't really notice a difference. All they are required to do is use their microphones when they're asking questions. The University of Ottawa is now using this system to deliver on-campus science courses to distant communities. There are also other people on campus who hope that this electronic blackboard will be used with their courses as well.

If you decide not to teach from the live classroom but to teach just for off-campus communities then there are certainly other graphics systems available but they are difficult to handle if you are using the classroom setting. For example, the telewriters employ a small pad which is very difficult to write on in the classroom, and students have to look at small monitors. That's not the natural setting for the classroom, but it will work very well if you are not teaching a class in front of you. Telidon presents similar problems.

It has been mentioned that the clientele for distance education courses at the University of Ottawa is changing and they are asking for more specialized types of courses. In the fall of 1983, one of our most exciting programs to be offered is a program with the Faculty of Science and Engineering. These are some of the first courses that will be offered using the Electronic Blackboard. The University had been asked by someone in the high-tech industry why the universities could not offer these programs to the workplace, given the modern technology that is available. That was all I needed, of course, to jump in and show them that this technology was available and indeed

we were willing to offer them the courses. As a result, we will be going out live from campus to three high-tech centres in the Ottawa region with the science program. Our aim is to start offering the Masters of Engineering program and the Masters in Computer Science live from the campus.

It's not only an advantage to those high-tech industries, but it's also an incredible advantage to the University because the university is going to profit from the expertise available in high-tech industries. We may have a course that we want offered which they also want but we don't have the specialist for it. If the high-tech industry has one of the specialists, we can make use of that person to offer the course to our students and their students at the same time. It also means that our students in the graduate programs will be able to work on their research projects in the field with many of these high-tech firms. It will also mean that if these high-tech firms have people that are working on projects in this program they will, in consultation with the University, be able to co-ordinate the two so that the development research they are doing will also be accepted as a project for one of their major papers or thesis at the University.

This project is certainly only the beginning. The spin-off is already starting; other communities have heard about it. For example, the City of Cornwall, which is trying to attract small industries, wanted to know if they could assure prospective industries that if they come to the community, the university would arrange for professional development programs live from the campus and therefore avoid having to travel all the way to Ottawa. We agreed that we could do that. We will be looking into not only programs that are leading to a degree but also professional development programs, upgrading programs, that we will offer live from campus to those communities. Calls and requests have been received from several different communities, up in Chalk River, for example, so we will probably offer this type of program there as well.

A second new program that's on the map now is for the School of Nursing. It has been decided that by the year 2000, nurses should have a Bachelor of Nursing Science which means that many of the nurses who currently don't have this degree will be looking to upgrade their standing immediately. Since most of them are working, it will be impossible for them to take a few years off work to come to the university to take these courses. Furthermore, there is no way that the university can suddenly add to its staff the number of professors required to teach all the nurses that are out there in those communities. Consequently, we will be setting up a tele-education network for the nurses starting in the fall.

Along with the two nursing courses we will be offering a basic anatomy course. It's certainly going to be interesting for us to be able to say that with audio conferencing you can teach anything, even anatomy. The course will be taught by one of our leading professors who won the teaching award last year for the best teacher on campus. With this anatomy course, he will use approximately 800 slides, duplicated and available in all the five centres receiving this course, and also six one-hour video tapes of the slicing up of bodies so that different parts can be seen. The only difference in using video tapes is that the students won't get any blood on their hands.

The next project that's starting is the Faculty of Education program at the University of Ottawa. The Faculty of Education is primarily concerned with getting special ed programs and basic computer programs out to the Francophone communities around the eastern part of Ontario: North Bay, Penetanguishene, Kapuskasing, Toronto and Barrie. We are hoping to start out with this program and then we will be looking into the possibility of offering the Masters of Education program in French from the university campus to the campus in St. Bonafice, Manitoba. All via audio conferencing.

We have a generalized system that we are hoping to explore. The constitution of the University of Ottawa says that the university must serve the Francophone communities of Ontario. For the moment it has been very difficult to serve the Francophones other than in the Ottawa region. Now with teleconferencing we are hoping to explore the possibility of setting up a teleconferencing network throughout the province of Ontario so that Francophones wherever they are will be able to follow post secondary education in their own language. Naturally we know this is a very difficult program and it could not be developed properly without great assistance from the Ministry of Education and close collaboration with the other universities in the province. That is one of the projects being investigated.

There are also other major problems to be solved. From my personal point of view I think that it is relatively easy to solve the problems of transmitting information from one centre to several distant centres. It seems that if you have the money all you have to do is set up the network since the technology is already here. But it is my firm belief that acquiring knowledge is much more complicated than listening to information over a network.

It is my belief also that the success of the tele-education program will depend on the support systems that we are able to build along with the delivery system. By support systems I mean first and foremost library services but also academic and personal counselling services.

These are the problems and as tele-education network expands to smaller more remote communities with more higher level or more specialized courses requiring research using more specialized journals and books, we are faced with what I think is the major problem for the university and colleges. We have not solved it and I would like to know if anyone else has solved that problem. If anything holds us up it is going to be that problem of the support system for research and counselling. The University of Ottawa has the complete library index on-line which means that within a year it will be accessible by telephone from anywhere in the country. However it is still not going to help the small remote communities to know that on-campus at the university such and such books are available or that they are available at Western or in Toronto. The problem of getting books and research materials out to those communities is a major problem. I would suggest that the combined resources of the universities and colleges, the local school boards and libraries in those communities and certainly assistance from the Ministry of Education will have to be used to establish regional research centres in the form of libraries, computer labs and video centres. Unless that's done I can't see that teleconferencing will develop well. It may develop but we are going to reach a point where we are blocked and the academics are going to say

that unless that community, for example, in Hearst or Hawkesbury, has access to a decent library they are not going to be offering any courses by teleconferencing.

The future as we see it, and the future that we are hoping for, is one in which a teleconferencing network will develop, as it is starting to, across the province and across the country, so that the universities will be able to share much more easily the specialties, in each one of the centres, that the level of education will rise, and that the higher level of education will become available to a lot more people because of teleconferencing and tele-education.

THREE BUSINESS USES OF AUDIO TELECONFERENCING

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3M's uses of teleconferencing can be seen through an examination of three particular illustrations: the "Fighting Back" Program (described here in detail), a Safety Security Conference, and Customer Service applications.

First, what does fighting back have to do with teleconferencing? Fighting back became a symbol and a theme which 3M introduced in late '82 to counteract problems which are common today in many businesses in Canada. The industries we were working in were far from stable. Many of our employees were snakebit because they were forced to work longer hours, give up holidays and spend a considerably longer time between salary increases. Management decided to fight back, to have our employees trained and ready for the turn around, through education and positive reinforcement. We were going to bring the campuses of the many universities, associations and great enterprises in Canada right to our door at 3M, to provide training in subjects ranging from hands-on computer training, to mini-computers, personal finances, stress in the workplace, legal affairs, etc. All these educational sessions were to be two hours long and held during the lunch period. 3M was fighting back. However, we had a problem.

3M is a large company. We had 2,500 employees, 1,500 being in the London Head Office. We could reach the latter easily, but the problem was to establish communication with the 1,000 offsite employees, scattered throughout our many plants in Canada. It was imperative, as well, to establish a two-way form of communication because the very essence of the program was to encourage the employees themselves to choose the topics that they wanted to be educated in. It would be a difficult task to send head-office talent travelling coast to coast. At the same time, we wanted to demonstrate clearly to the employees that their input concerning the kind of programs they wanted was very important to us. Furthermore, we had to do this in 12 different locations in Canada.

Therefore, a very simplified form of teleconferencing, involving 12 co-ordinators in 12 different locations was introduced. First we appointed 12 offsite co-ordinators and started dealing with these people through the teleconferencing calls. We introduced the program to them and advised them by telex that they were going to receive a conference call, giving them the date and the time.

At the same time we mailed to the 12 locations posters and promotional literature dealing with the fighting back theme and explaining the education and training idea. The material was not to be opened until a teleconference call was received. We established a simple agenda, which was to be adhered to by our 7 people assembled together in head office and the 12 co-ordinators. First, we would check all participants coast to coast to see that everybody was on line, and then we would introduce the program, ask for feedback, thank them, and finally sign off. Nothing complicated.

There was a total of three conference calls on this particular program. The first one aimed to introduce the concept of fighting back and to clarify what we hoped to gain from it. The second conference enabled co-ordinators from the 12 different locations to report on the education and training programs that had been established at each particular factory site. Just recently, a third conference call was made to gather a final report of the results.

What were the results? The main objective of management was to impress the importance of the program on all employees and to get as much participation in other centres as in the captive on-site market, which we had in London, Ontario. In London, fifty five percent of our 3M'ers chose to be educated and trained. In our field locations, seventy five percent chose to do so. Therefore, the message certainly did get across. In this case, we found the system effective -- although that does not mean that in other cases we would not consider more traditional methods, such as correspondence or personal meetings. These methods are not yet obsolete.

One of my concerns when we started teleconferencing was whether everyone would remain in contact throughout the conference. We did lose someone on the first call, the second call was pure, and on the third conference we lost one person for half the call. All in all, it cost us $1,525 for three confrence calls involving about one hundred and twenty minutes of meetings. If we had sent two coordinators east and west, it probably would have taken a week to reach all the people involved. We accomplished the same business with three conference calls. For $1,525 we succeeded in having an excellent program, and enjoyed the price.

We also use teleconferencing at 3M to link members of our safety and security committees, in each of our off-site locations. If there is a panic situation, or a problem on either the issue of safety or security, we reach each committee on a point-to-point basis. In February of this year, we had our first emergency call, from Winnipeg -- our branch was flooded. It took us seven minutes to assemble our engineering, insurance and safety management personnel in London -- in seven minutes, we were all on the phone. The call from Winnipeg was actually made from a telephone booth because the individual could not get into the flooded building. This gives you an idea of the flexibility of the system. In this particular area, we are going to establish a three month safety and security check with all our branch offices in off-site locations so that we can try to prevent problems from arising, instead of just reacting when they occur.

We have also used teleconferencing for Customer Service. For example, we've established a customer service forum, where our grassroots people, right at their work stations, can talk to their colleagues, coast to coast. These discussions are held every month for one half hour. They are co-ordinated from London and senior management listen to the discussions. Teleconferencing is a good way to get your grassroots organization involved right at their stations.

I have found, in my experience with teleconferencing, that there seems to be a lack of intimidation. Head Office of a large organization can often completely intimidate smaller groups. In the case of our conference call, we had seven head office people, but also twelve from small areas. I sensed that the non-head office people felt that they had a bigger share in the discussion than they might have had in a face-to-face meeting. I found, too, that everything we said to them was received immediately -- there was almost an economy of listening. It was as if they were treating the call as a long distance call, not as a cheap $500 conference.

In conclusion, I would like to say that certainly personal face-to-face conferences have their place. But I think we have proved at 3M, in any event, that teleconferencing can be used very effectively to launch national programs and get people involved. Very good results can be achieved for very little cost.

AUDIO TELECONFERENCING IN THE HEALTH CARE SYSTEM

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I. INTRODUCTION

Audio conferencing has been defined as "two-way voice communications between two or more groups, or three of more individuals, who are remote from one another and are using a telecommunications medium".(1) The use of audio conferencing in the health care system is generally subsumed under the title of Telemedicine or Telehealth, which is usually defined as the use of any telecommunications technology in the health care system.(2) Both terms are used in projects across the country: for example, (a) when the Ontario Ministry of Health became active in this area, it adopted the term Telehealth; (b) the University of Western Ontario in London calls its system Interactive Telehealth; (c) Memorial University of Newfoundland uses the term Telemedicine and Health; and (d) the Toronto General Hospital/ University of Toronto adopted the term Telemedicine for Ontario.

I propose to deal with two aspects of this topic: (a) the development, application, evaluation and future of audio teleconferencing in the health care system; and (b) a description of the Joint Telecommunications Project as an example of one particular application of this technology.

II. AUDIO TELECONFERENCING IN THE HEALTH CARE SYSTEM

(a) Development

As shown in Figure 1, the use of audio conferencing in Canada is a recent development dating just over a decade, although there were experiments in telemedicine in the United States as early as 1950. Because this conference focusses on Canadian developments, I shall not make reference to the American work; an initial appreciation of developments in that country can be gained from the Telemedicine-Telehealth Bibliography. (2)

The date of 1972 was picked as the first reference point for developments in Canada as it was at approximately this time that the Federal Department of Communications began to stimulate an interest in telecommunications focussed on the use of its Communications Technology Satellite, Hermes. In 1972, the University of Western Ontario and the Memorial University of Newfoundland began to plan one-way television programmes for the 1976-77 year.(3) These one-way television programmes had a return audio signal which is why they are categorised as the first beginning of the use of interactive audio in Canada.

By the time these two projects actually occurred, the Sunnybrook Medical Centre and the Hospital for Sick Children had received funding from the PSI Foundation to experiment with the use of interactive audio conferencing, supplemented by freeze frame or slow scan television. That project continues to exist on a self-supporting basis and will be described later in the conference by Dr. Earl Dunn. The other new project that occurred at approximately this time was also the result of the Federal Department

of Communications' interest in its Anik B programme. Memorial University again participated, as did the Universite de Montreal.(4) The former involved interactive audio only, while the latter used both video and return radio as well as interactive audio supplemented with freeze frame or slow scan television. Also at this time, Memorial University began the implementation of its four-wire dedicated audio system, modelled very closely on that of the University of Wisconsin.(5)

By 1982, the last reference point taken on this chart, not only were Memorial University and the University of Western Ontario still active in the field of interactive audio and interactive video respectively, but the University of Alberta and the University of Calgary began using two-wire audio systems in their continuing medical education programmes. The Faculty of Medicine at the University of British Columbia was actively involved in using the Knowledge Network of the West, based in British Columbia, and the University of Saskatchewan had done a feasibility study related to interactive audio conferencing. The Toronto General Hospital and University of Toronto had established the Joint Telecommunications Project with the Royal College of Physicians and Surgeons of Canada, and both of these had their own independent interactive audio projects. McGill University, the Chalmers Hospital in Fredericton, and Dalhousie University were also taking an active interest in interactive audio by this date.

It can thus be seen that over the course of the decade, interactive audio made a rapid transition from being a minor part of the planning process for large video projects to becoming the primary activity of several health agencies across the country.

(b) Applications

(i) Continuing Education

There is increasing pressure on all health professionals to participate in continuing education programmes. The explosion of knowledge makes any educational programme, no matter how excellent, outdated in a very short time. Without enumerating all of the participating organisations, the general point should be made that virtually all medical school continuing education departments have now had experience in using interactive audio in the delivery of continuing medical education, as have several nursing education agencies and allied health professional organisations.

The objective of all the various initiatives has been to deliver continuing professional education to health professionals in remote areas, who do not have access to face-to-face educational programmes on a regular and frequent basis. Audio conferencing is used to supplement the traditional face-to-face programmes such as workshops and seminars.

The target audience of these interactive programmes has covered the entire spectrum of hospital-based health professionals.

While the following statements are obviously an overgeneralisation, it is fair to state that most of the programmes use a one-hour format, in which one or more resource people make a presentation that may last from 20-40 minutes, often based on precirculated slides or handout materials. The remaining portion of the hour is devoted to a question-and-answer discussion period, with all sites being able to ask questions of the resource people.

(ii) Administration

The use of audio conferencing for administrative activities such as committee meetings is not yet as widespread among health agencies as are the continuing professional education activities. Nevertheless, it is generally the case that when networks are set up in order to deliver educational programmes, they become increasingly used for administrative activities.

The two general objectives are: either (1) to reduce the amount of travel that committee members must do to participate in meetings, and/or (2) to supplement face-to-face meetings by teleconference meetings that add to the existing pattern of meetings. In the first instance, organisations may be able to show that they have effected financial savings in that the cost of teleconferencing is considerably less than the cost of travel. In the second application, the overall budget of the organisation may increase slightly but there are benefits in that business is transacted more speedily and activities can take place that were not possible before.

The primary users of administrative teleconferencing to date have been provincial health organisations, since most of the networks that have been developed have been primarily provincial networks. Nevertheless, as a result of the Royal College Teleconference Project, several national organisations are beginning to experiment with the use of audio conferencing. It should be noted that these comments are valid only with respect to the use of 'customer-owned teleconferencing equipment'. Various organisations have undoubtedly used conferencing facilities provided by the common carriers but this has not generally been documented in the literature.

The experience of health users to date has not been greatly different from that of business or government in terms of the general categories of tasks that can best be accomplished by teleconferencing. For example, teleconference meetings are generally shorter than those held face-to-face. They are excellent when the agenda covers a number of routine factual items, but face-to-face meetings are preferred when delicate matters such as negotiation of controversial matters must be conducted. Teleconferences have been used to preplan face-to-face meetings and finalise an agenda for them, and to hold an emergency meeting to resolve an examination question across the country in the midst of the administration of such an examination.

(iii) Patient Care

In one sense, virtually every hospital and physician in Canada has already used audio conferencing in this area since virtually all health professionals use a telephone to consult each other about particular patients. However, there have been two major projects that have focussed on this area, primarily the one at University of Western Ontario and at the Universite de Montreal.

The objective of such activities has been oriented to the diagnosis, the treatment, or the support of the patient. They are also sometimes oriented to supporting isolated health care professionals as they treat patients in their community. The general objective, common to all these, is to provide primary health care personnel with access to the expertise of secondary and tertiary care health professionals.

While interactive audio systems can be used to provide these functions, the projects that have occurred to date in Canada have generally used either one-way video transmission to supplement the audio, or freeze frame or slow scan television. In addition, there are a number of devices such as electro-encephalograph and electro-cardiograph machines that can transmit medical data over telephone lines. The latter type of equipment is used on a widespread basis in many hospitals and physicians' practices across Canada, and it is so widespread that very few people take the trouble to write it up as a formal project. The Hospital Sacré-Coeur in Montreal has one of the most distinguished records of activity in this area.(6)

(c) Evaluation

(i) Process

Acceptance: All of these experiments with interactive audio have found the technology to be well accepted by the health care professionals using it. The clearly obvious trend towards greater utilisation of interactive audio, in particular, in the past decade would not have developed without such an enthusiasm. Most of the CME departments that have been involved in any of these projects have done user surveys and have consistently found a positive attitude to the technology.

Participation: Precise participation rates are not generally available with respect to the numbers of people participating in individual programmes. However, it should be noted that when Memorial University started its dedicated audio system, it had only eight hospitals outside of St. John's on-line, and it now has over 30 such hospitals on-line. Virtually every hospital in the province is part of the network. Since each hospital has to pay an annual user's fee, this increased participation is note-worthy. The Telemedicine for Ontario project, which started with one hospital participating in one programme a week in May 1982, now has over 40 hospitals in Ontario participating in approximately five different programmes offered each week.

(ii) Outcome

Effectiveness: There has been very little written about the effectiveness of audio conferencing in telemedicine. However, studies of University credit courses have shown that audio teleconferencing is just as effective as face-to-face classroom teaching in terms of the performance of students on final examinations.(7) These results have been obtained in several different programs and encourage the belief that audio teleconferencing is an effective method of delivering education programmes. By implication, therefore, teleconferencing should be an effective method for delivering continuing medical education. However, the effectiveness of such education delivered face-to-face has not yet been consistently established. The use of communications technology has not generated any research tools that are better at addressing the issue of the general effectiveness of continuing medical education.

Cost: A major factor responsible for the rapid development of audio conferencing in the health care system has been its low cost and accessibility compared to many other communications technologies. For example, a one-hour telephone call between Toronto and Montreal costs approximately $50 while a one-hour video circuit costs approximately $500. Telephone circuits are available virtually throughout the country, whereas

many small remote communities do not have video circuits. Technical developments are rapidly changing these factors and are making video increasingly feasible.

The cost of audio conferencing is substantially less than that of travel. Even a return train ticket from Toronto to Montreal now costs $80. With the exception of the work done by Dr. Earl Dunn, there have been no studies of the cost effectiveness of telecommunications in the health care system.

(d) The Future

Informal feedback from the various organisations that have just had their initial experience with audio teleconferencing in 1982-83 indicates that they plan to make increasing use of the technology in the coming years. Also, it appears that groups not presently using the technology are hopeful of doing so at the earliest possible time. Once regional and/or provincial networks are firmly established, then there will likely be a trend towards linking these systems into inter-provincial and perhaps ultimately national networks to facilitate the programme applications, particularly in continuing education and administration. As the networks become more firmly established and the basic expense of the audio network is covered, there will be a trend towards use of supplementary technology such as freeze frame television, Telidon and other such devices. Finally, the use of video is ultimately inevitable as its costs continue to come down. From a technical and cost standpoint, point to multi-point video with return audio is likely to be the easiest to implement on a widespread basis.

III. CASE STUDY - JOINT TELECOMMUNICATIONS PROJECT

(a) Background

The Joint Telecommunications Project was created by the Royal College of Physicians and Surgeons of Canada and the Toronto General Hospital. The co-directors from these two agencies are Dr. A.M. House, Memorial University of Newfoundland, and Dr. B.A.T. Pedersen, Toronto General Hospital. The project was initiated in April 1982 and has thus only just completed its first full year of operation. A report is currently being prepared that will ultimately be used for publication purposes, and it is therefore not appropriate to comment on the project in any detail at this particular time. However, with the agreement of the co-directors, it is possible to make a few general statements.

The objective of the two organisations in making their joint agreement was to explore the use of interactive audio in the health care system. To accomplish this objective, they decided to purchase a 20-port Darome Co-convenor Meet-me bridge.

(b) User Needs

While there was no formal pre-implementation study done, both organisations knew the areas of general need that they wished to address. The Hospital was particularly interested in exploring the use of audio conferencing in the delivery of continuing educational programmes to health professionals in Ontario, scattered over an area of 412,500 square miles. The College was particularly interested in exploring the role of audio conferencing in facilitating its work; the College has a membership of

19,500 fellows. This study itself is a demonstration project which has as one of its secondary objectives to identify user needs in detail. Central to the concept of the project was the idea of establishing a consortium of users since it was felt from the outset that it would not be feasible to restrict the use of the Meet-me bridge to just the two co-sponsoring organizations.

(c) System Design

The core of the system is the Darome Meet-me bridge which is located at the Toronto General Hospital. To participate, sites need only have either an ordinary telephone if a single individual is participating, or a speaker phone or Darome Convener kit or any other device that will permit a group of people to participate. An ordinary telephone line is used to dial in to the bridge which can conference up to 20 sites.

(d) User Training

In addition to providing a technology, the project also provides training to those who wish to use the system. There are generally two categories of users: (1) those who are involved directly with the Royal College or with the Toronto General Hospital in providing programmes sponsored directly by these organisations; and (2) personnel affiliated with any other provincial or national health organisation that is using the bridge for its own independent purposes. User training is provided in whatever detail people wish to receive it and is based upon print (for example letters, and brochures), the telephone (either on a one-to-one basis or through the bridge on a teleconference), supplementary materials such as slides in conjunction with a teleconference and face-to-face meetings wherever appropriate. It is felt that one of the important advantages of this technology is that it can be used in order to prepare people for formal programming later on. The technology can thus provide user training and overcome distances for people who are not located in Toronto.

(e) Results

Since April 1982, the use of the bridge has increased substantially and the geographic area from which participants have been drawn has been substantial. Figures 2 and 3 provide you with information on the sites within Ontario and across Canada that have participated in teleconferences to-date. It should be noted that the map of Canada does not take into account all of the sites that participated in teleconferences as a result of local projects in Provinces such as Newfoundland and Alberta; many of these sites have been conferenced into Royal College programmes through use of the local bridge in those Provinces.

As shown in Figure 4, usage has increased from an average of 18 hours per week in September 1982 to 50 hours per week in June 1983. Since it is generally accepted by the Commercial Conferencing Services in the United States that a growth in usage of 20% per annum is considered successful, it can be seen that this project has far surpassed that index of success. The College and the Hospital are greatly encourage by these preliminary results and will be able to provide more detail once the reports are compiled over the summer.

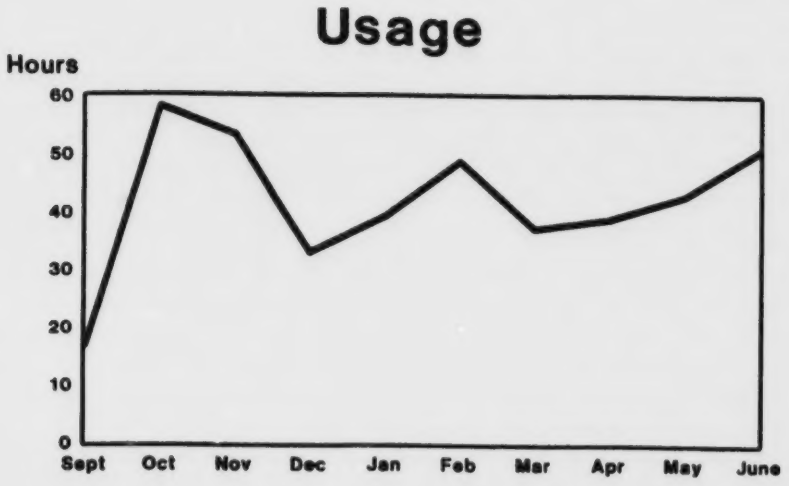
The implementation of this particular project thus seems to indicate that audio teleconferencing has substantial potential both within Ontario and at the national level. There appears to be every reason to look forward to an increasing number and range of activities in the coming year.

Figure 1

Figure 2: Participating sites in Telemedicine for Ontario

Figure 3: Participating sites in Royal College Teleconference Project

Figure 4



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COMPUTER CONFERENCING

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If one thinks about it, computer conferencing is a system which does not seem likely to exist. There are other unlikely systems in nature -- we have the duck-billed platypus, the three-toed sloth, etc. But if you think back to the days of yesteryear, say fifteen years ago, when we didn't have computer conferencing, and imagine yourself trying to describe the wonders of computer conferencing or computer message systems to an executive of that time, you'll understand just how unlikely these systems are. Yet, they do exist, and people use them. I am going to describe in general terms, what computer communication systems do and how they are used.

Computer conferencing means different things to different people. Some consider any kind of message system where a number of people are interacting, using text and graphics, on a computer, to be conferencing. Others use this term to refer only to full-scale conferencing, with secret voting procedures and all the bells and whistles. My discussion will encompass the variety of computer message systems currently available, from the simplest to the most complicated.

Computer conferencing originally started back in about 1968, with Dr. Murray Turoff, at the New Jersey Institute of Technology. At the time, Murray was working with the office of Emergency Preparedness in the Federal Government of the United States. They had need for a quick way of tying together experts and a variety of people all across the country, to formulate emergency plans, or whatever an office of Emergency Preparedness does. They found that they could develop a computer system where one could dial a number, sign on to the system and gather comments on particular issues very quickly. In fact, they ran a few very early conferences and they were quite happy with them.

Dr. Turoff has continued working in this field, and has essentially made computer conferencing his life's work. He has a system called "EIES" at the New Jersey Institute of Technology. This system is being used quite a bit in the United States for advanced conferencing.

The kinds of systems which have been developed since Dr. Turoff began his work, vary in terms of their capabilities. At the simplist level, one has an electronic mail system. Even the post office is going to offer electronic mail. These systems do pretty much what you would expect to do if you were writing a letter. They give you the capability of composing a message and usually have some form of editor on the system. You sign on to your computer system, type a message and edit it. You indicate for whom the message is intended and the computer sends it to them. The advantage with a computer system is that you can have what we call a synchronous communication. When you send someone a message, it doesn't matter whether they are there or not. When they sign on to the terminal, they'll receive it. That's a great advantage! Of course, if they never sign on you may have a problem but, on

the whole, it works quite well. You can also store messages and there's one sadistic little feature that I think is rather nice -- you can date them. This means that when a person to whom the message is sent, reads it, you get notified that they read your message. So there is no more of this nonsense: "Oh, my secretary lost it", or "Yes, I saw that but, ah, I don't know where it is", or "I'm sorry, I didn't have time, I was too busy" -- you know when the message has been read.

Studies have been done on the use of these electronic mail systems in various organizations and there are some interesting applications. For example, you can postdate messages, so you can send your wife her birthday greetings for the next four thousand years, just by programming it into the computer. Such a gesture might lack something, but at least it would be done on time. Also, these mail systems are basically very simple to use and they're quite cheap; they don't use a lot of computer time. You can broadcast; you can send messages out to thousands and thousands of people, all with just a push of a single button, assuming you have the names and addresses programmed in. When I say addresses, I mean the addresses on the computer because of course, the way our laws are set up, we can't send mail; that's the post office's jurisdiction only. However, there are a few little drawbacks even with computer mail systems, because one of the things you find is that people get very wordy and they like to send long messages. They ramble on and on, much like they do when they're talking. If you get a number of people like that on the system, you can receive a tremendous amount of verbal garbage.

The electronic mail systems, just outlined, are the simplest of the computer conferencing systems. I'd like to go on, now, to describe Discussion systems, which are a little more advanced than computer mail systems. I don't mean to imply that these are necessarily completely different systems; it's more of a continuum. Some systems will have all of the features and some of them will have less of them. Discussion systems allow you to create a closed discussion on a particular topic and include certain people in it. Instead of just sending mail out, you can say "Well, I want you, you and you to sign into this discussion"; in a sense, permission is given to join in, although some discussions are open to everyone. In this way, certain issues concerning a particular topic can be talked over. It might be a memorandum the boss has sent out the day before; it might be plans for an upcoming conference; there's any variety of topics that can be discussed in this way. You can have it completely private so that participants remain unknown to each other. The chairperson would know who is taking part, but the other people wouldn't, so code names are used, in case people want to make remarks that would be considered somewhat inflammatory in some circles -- or defamatory in others. This system also usually has simple searching routines, so that you can search through old comments, which are usually dated by day and time and see what past participants have said. Or it may have a key word search, so you can find out what people have said about a particular issue.

Moving along the continuum, we find the full-scale conference systems. Systems get a little rarer as we go down the list, because they get larger, more complex, harder to learn how to use, and more expensive. The conference system usually has a very formal kind of structure. Generally, it involves a chairperson, certain voting rules, procedures to introduce participants, or to

preserve anonymity, if desired. The computer conference is facilitated by the variety of summaries and the extensive text-searching capabilities which are available.

There have been a number of computer conferences run and, quite frankly, they're about as much work as running a regular conference, although the advantages are that you don't have to leave your office and you can participate when you want to. So instead of going to Toronto, enjoying some food, nice weather, maybe a drink, going out with some friends in the evening, you can sit in your hot, stuffy, sweaty little office and spend months typing things into your computer terminal. Doesn't that sound like fun? Actually, computer conferences are fun. Like many others, I find that I travel far more than I would like to and would be happy to participate in computer conferences, to some extent, if it could keep me at my desk a little more.

When I say conference systems are rare, I really mean that there are not a lot of full-blown computer conferences being conducted at any one time, although there are a number around. I think that mainly you will find it being used among rather high-tech people, or among very busy professionals. I know that some doctors participate in a number of computer conferences and they can go on discussing technical issues over a fairly long period of time, without leaving their office. There are probably a few more computer conference systems going than I'm aware of right now, but generally the applications have been more towards the message area and the more informal discussion-type systems. In fact, most companies that have a computer have a message system or an electronic mail system of one type or another. Not everyone in the company may know about it, because the data processing people use it for their own internal communications, but it is probably available for use by others.

There are a few other features of computer conference systems which are often available. One is a note book, where you can keep private thoughts or comments that you found particularly relevant, or jokes, or phone numbers, or whatever you want - it's basically like a note pad. You just jot down whatever you want; you can index it however you wish. Often you'll see a schedule, or some kind of time management capability added, to facilitate the scheduling of your time.

What are some of the drawbacks of these systems? One of the areas of concern with some of them is the capabilities of the editor. Very often the system itself is fairly easy to use. You just press 'send' to send a message, 'receive' to receive it -- it's not at all difficult. However, the editor of this system may be very complex; it may be difficult to figure out how to change the text that's been entered, often this is the editor's downfall. Also, many systems are designed for the computer's 'convenience', rather than for the user's. For example, some computer systems, which are supposed to be advanced user-friendly mail systems, require "file" to be typed in for transmitting messages, rather than "send", or "transmit", as would appear more natural. Why "file"? Anyone with a computer background would know that you don't really send anything on a computer, you just transfer it to a file and that's the way the computer language works. Therefore, whoever designed the system was obviously more machine-oriented than people-oriented. I think that the real impact of computer message systems will be felt when they start

designing systems that are very easy for human beings to use. We don't care if it's tough for the computer: that's a piece of wire; let it do whatever it wants to do, as long as it doesn't control our behaviour.

In conclusion, I would like to mention, briefly, some areas of application of these systems. Potentially, you can connect many hundreds of people together. Of course, if you get more than three hundred people on to a computer system at once, it gets pretty slow, but, you can have a network across the country to tie local offices together or people within head office together. It's mainly used among geographically dispersed groups or among people dispersed in time, those whose schedules are so bad that there's no possibility of them ever getting together in the same location at the same time, even if their offices are next door. Or it may be used for very busy people who have a lot of visitors, or other demands on their time. We find that if you have those kind of applications, computer conferencing or computer message systems or discussion systems can be of value to your organization, because they solve a need. I don't really think that my mother wants to get birthday greetings from my friendly, neighbourhood computer, no matter how well written, and I don't think that it's going to replace a lot of human interaction as we now have it. But I do think that it's a great replacement for noninteraction, which is one of the problems resulting from our busy schedules.

This outline is meant to be only an introduction to this branch of telecommunications. For a more thorough and practical demonstration, it would be advisable to attend a workshop on the different systems, such as the one presented at the Conference on Teleconferencing organized by the Ministry of Transportation and Communications, in June 1983.

THE FUTURE OF TELECONFERENCING

R. Douglas Sloane
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[now: Telecom Canada]

Throughout the world, the telecommunications industry is currently in a period of dynamic evolution and rapid expansion, and one of the fruits of this process is the promising innovation that is the reason for this conference.

Still in its infancy, teleconferencing is already a useful tool that can enhance productivity and reduce operating expenses in any business enterprise. Much of the credit for bringing it to this stage of development must go the Transportation Energy Management Program Task Force, the organizers of Teleconference '83. I'd like to begin by applauding the task force for all it has done to promote the use and usefulness of teleconferencing.

As you know, one of the [Telecom Canada] member companies, Bell Canada, has worked closely with TEMP in a number of areas, including the establishment of Bell's In-House teleconferencing demonstration. In fact, several Bell Canada and [Telecom Canada] people are seminar leaders at this conference. Clearly TEMP's active support has been a key factor in bringing teleconferencing to its present status as a healthy and growing service.

With respect to the future -- well it is rather intoxicating to be asked to address a captive audience on the future of anything -- there is a strong temptation to emulate Toffler and take you to the outer edge of possibilities.

However, I'm not Toffler, and I've had some sobering experiences with respect to the business of forecasting long-term futures.

Some years ago -- about 25 -- a large Ontario telephone company commissioned a study by an American institute that specialized in 'Think-Tank' forecasts of the future. The institute was to produce a life-type scenario of 'Ontario in the year 2000' which hopefully could be used for planning purposes.

A very interesting report was produced -- in that it was simply an account of one day in the working life of a mid to senior manager in a large Ontario based corporation. I think his name was Harry.

Harry rose in the morning in his luxurious pre-fab home on the bluffs of Ten Mile Point on Manitoulin Island, jumped into his diesel powered hydrofoil, skimmed across to Tobermory, got into his personal high-powered automobile, turned on to the superhighway with thousands of others, and was whisked off to downtown Toronto under computer control at 200 mph. Total travel time was 90 minutes. And, of course, the whole performance was repeated in the evening.

The point is that 25 years ago even the 'expert' futurists could not visualize a society concerned about hypothetical Harry consuming non-renewable resources and polluting the environment at levels comparable to an entire Ontario village today.

It was very tempting, in preparing this talk, to position Harry in his home in Ten Mile Point with a skylit office complete with wall-size video screen and instant access to every data-bank and person necessary to the performance of his job.

However, that is certainly in the realm of long-term futures, and when I'm asked about long-term futures I tend to rely on a statement attributed to the Russian author, Tolstoy.

He was once asked if he understood the aspirations of women in society. Tolstoy, perhaps a bit of a futurist himself with respect to the role that women would ultimately play in the modern world, replied: "When I am prepared to say what I have to say about that -- I will have one foot in my coffin -- and when I am finished -- I will pull the other foot in and close the lid". Well, having no desire to speak with one foot in my coffin, I'm going to leave Harry marooned on Ten Mile Point -- which, if you have ever been there, is not such a bad fate -- and concentrate on the realistic opportunities and problems that bear on the future of teleconferencing.

In essence, teleconferencing is a method of disseminating information, and information systems are what business management is all about. Today, information is a major resource. The rapid transmission of accurate information is essential to the success of any business organization.

The basic advantage of teleconferencing is that it exploits technology to enable two or more people to talk, exchange information and make decisions without incurring travel expenses.

Actually, it saves more than just the travel costs. The unproductive time spent in travelling usually exceeds the time spent in the meeting itself. In the end, this combination of travel expense and loss of time often prevents people who should be at meetings from attending them. Thus, one of the real benefits of teleconferencing is that it permits and encourages the right people to participate in meetings, and do it more economically.

At this point, some of you may be tempted to point out that a meeting is still a meeting and, as such, all too often a thief of time and an unproductive part of your daily business schedule and mine. It's a valid point. Teleconferencing in itself won't take the time-wasting inefficiencies out of poorly planned meetings.

But I am convinced from my own experience that a well conceived and properly directed teleconference can add an extra element or dimension of effectiveness to almost any meeting. Given a clear set of objectives, a well-prepared agenda and a firm discussion leader, a teleconference can prove to be more highly focussed and disciplined than a face-to-face meeting.

So, from here on, let's assume that I am talking about teleconferences that are really necessary, meaningful, and productive.

It must be conceded that teleconferencing has not kept pace with the optimistic forecasts of rapid growth that were made back in the 70s. These predictions were perhaps a bit unrealistic, even though the basic

logic on which they were founded was valid enough, embracing the need to conserve energy, cut travel costs, decentralize, automate, and integrate business offices.

Why, then, were they off the mark? One answer is that they assumed, too confidently, that new technology and the high cost of non-renewable resources were the only significant factors required to make teleconferencing a large-scale reality.

Another is that as the technology has become more complex, the cost advantage on which the marketing of the service was centred has lost some of its lustre.

In the early days the big selling point was that if you added up airline tickets, rental cars, hotel rooms, and meals, it was a lot cheaper to hold a teleconference. But today, with such add-ons as video enhancement, the gap between travel expenses and the transmission costs of teleconferencing has narrowed somewhat, although teleconferencing still has a distinct edge.

My own feeling is that its growth in the 80's is more likely to be driven by what the customers need than by what the available technolocy can do.

Before going any further, perhaps it would be useful to define more precisely what we're talking about.

[Telecom Canada] currently promotes teleconferencing as a family of products ranging from audio conferencing (which can be as simple as adding a third party to a telephone call) to full-motion video conferencing. Full-motion video includes point-to-point conferencing, in which two locations are linked by two-way audio and video; and point-to-multi-point conferencing, where a camera at one location transmits one-way only to several points -- all connected by a two-way audio.

We talk about it as a single service, but a teleconferencing system is really made up of four major components -- terminals, transmission equipment, bridging apparatus and users. Let me emphasize that human communications skills are as critical to the success of the teleconference as the equipment.

As I'm sure most of you know, teleconferencing technology has become sophisticated enough to allow us to provide almost any kind of service our customers are willing to pay for. That includes life-size, high-resolution full-colour video conferencing right around the world, incorporating all the messaging, hard-copy transmission, interactive graphics, signalling, controlling, information storage, and retrieval that anyone could ask for.

The limitations are essentially economic, and matters of timing. The question isn't what can be done, but rather what can be done soon and at a reasonable cost.

Narrowband teleconferencing services provided over the public telephone network represent the main form of teleconferencing today. These services include audio-plus teleconferencing, freeze-frame TV, electronic blackboards, videotex, and graphic tables.

Because these services can operate over the public telephone network, they allow virtually universal access.

Over the next five years, the largest growth area will undoubtedly be in audio-plus conferencing. Basically, audio-plus involves the use of visuals, short of full-motion video, to enhance a regular audio conference.

I should explain that when visual information is added to an audio conference, you have to do one of two things, either you arrange for an additional telephone line to handle the data, or interrupt the talking every time the data has to be transmitted. This slows things down and detracts from the interactive process.

The point is, our existing facilities can handle either voice or data, but not both, without some extra costs. The integration of voice and data on a single pair of copper wires is technologically feasible but is not presently economical and isn't likely to be a wide-scale reality until the 1990s.

Thanks to advances in microchip technology, audio-plus terminal devices are becoming more sophisticated, more numerous, and, in the process, less expensive. There are a number of suppliers now marketing such things as freeze-frame TV terminals, interactive electronic writing equipment, videotex gear, and facsimile systems capable of producing an image in less than a minute.

Improving the capabilities of present narrowband facilities will require a combination of new terminals, improved and augmented transmission systems, suitable bridging equipment, and a signalling scheme to permit their use.

New terminals and bridges which automatically compensate for transmission losses in audio conferencing are now available from a growing number of manufacturers. Ultimately the problem is likely to be best solved by improvements in digital technology.

Advances in bridging are taking place not only in Telco central offices but in dedicated customer premises bridges and new PBXs. These advances are also contributing to the growing installation of private teleconferencing systems by larger business and educational institutions.

One factor that promises to improve network capability for teleconferencing is [Telecom Canada's] Datapac service. Datapac, a shared packet-switched intelligent data network, will help minimize user cost and maximize system efficiency since it is sensitive to information sent and distance travelled rather than duration.

Datapac, in conjunction with the voice network, offers the prospect of economical teleconfering with simultaneous voice and data transmission. When suitable bridging technology is developed, this system configuration should satisfy a large part of the requirements for audio-plus conferencing.

Looking a little farther down the road, the eventual goal of [Telecom Canada] is to encourage teleconferencing to come out of the meeting room and become an integral part of the much discussed "Office of the Future".

Our reasoning is simple: if the real objective is to make it easy and economical for people to attend meetings, then it follows that the most convenient place to attend meetings is at your own desk.

I see our present conference room technology giving way inevitably to fully integrated desktop systems. The conference room was the logical place to start because it's cheaper to provide teleconferencing equipment for groups than for individuals. But as customers multiply and costs come down, teleconferencing will move out of meeting rooms and into offices, starting with executives and gradually working its way down through the organization.

Actually, all the factors that have a bearing on the office of the future -- user motivation, the need for networks, the advent of network information services -- also apply to teleconferencing, which in turn becomes yet another step toward the electronic office of tomorrow.

Even now, work stations are evolving which will enable managers and professional people to access audio-plus facilities spontaneously as part of their day-to-day work patterns. Northern Telecom's displayphone is a simplified desktop work station that allows users to carry on voice communication, create text, and access databases through a single terminal.

Work stations of the future will undoubtedly feature larger screens, higher resolution, graphics scanners, light pens, and state-of-the-art hands-free voice units. One of the things they are not likely to incorporate is full-motion video; most people see this as both unnecessary and undesirable for desk-to-desk teleconferencing.

I mentioned earlier that we can set up two types of full-motion video conferencing. We can provide two locations with two-way audio and visual links or link one location with several others by the two-way audio and one-way video transmission.

Technically, the future of full-motion video conferencing depends on satellite communications for long distance links, with terrestrial microwave, fibre optics, and coaxial cable providing local access.

Video conferencing has only recently become practical as a result of a breakthrough in techniques for compressing the bandwidth of video signals. Recent developments in satellite Time Division Multiple Access technology have also helped to make more efficient use of available channels.

[Telecom Canada] recently announced Conference 600, a full-motion video conferencing service. Conference 600 uses TDMA technology to provide two-way interactive video conferencing.

Also on the horizon is a distinct improvement in the definition and sharpness of the video signal. Equally important, the declining cost of picture processors over the next five years will serve to make this medium more affordable.

Since the cost of video conferencing technology is still quite high, most companies are waiting for costs to decrease before considering using video conferencing on a regular basis. As refinements in transmission

technology bring down costs, however, I see more and more companies turning to permanent video conferencing facilities as an alternate method of conducting meetings. Organizations will find it easier to justify the cost of these facilities, not so much in terms of saving travel dollars, but in terms of improving employee productivity and efficiency.

Well, so much for the technology, let's talk about what really counts: the human factors.

It's one thing to devise ways and means of reducing corporate travel expenses; it may be something else again to persuade people to actually cut down on their business trips.

A Bell Canada study indicates that people who travel most are likely to be the easiest to influence. But even among those who travel at least 15 times a year, according to the survey, only 45% would prefer to reduce the number of trips. Of those who take less than five business trips a year, a mere 16% would favour cutting down. So the ultimate success of teleconferencing will depend, at least in part, on the attitudes of those who are called on to give up some of their travelling.

Our experience shows that teleconferencing is generally most effective among people who already know each other. This is probably because they find it easier to associate a voice with a face.

Our [Telecom Canada] Board of Management, whose members are spread from British Columbia to Newfoundland, makes regular use of audio conferencing, and we find it very effective. But with relative strangers you can have real problems.

In audio conferences, for example, you often have no clear indication of which voice is attached to which participant. Sometimes you don't know who wants to speak next, and there may be awkward silences. With video equipment, some people go to the other extreme and turn into 'performers,' which can be just as harmful to the effectiveness of a meeting. Another common complaint is that it's hard to get used to the disembodied voices that emerge from thin air in audio conferences.

In the long term, I think we can keep moments like these to a minimum by looking to advancing technology to solve some of these problems. But in the short term, all of them can be alleviated or overcome by the presence of a good leader who has really done his homework. I mean someone who makes sure everybody has received a copy of the agenda, introduces the participants, directs traffic, acknowledges speakers and keeps the meeting on schedule.

In the end, it's the quality of leadership that can make or break the effectiveness of a teleconference, and perhaps influence the future growth of the concept. The very fact that you are here at Teleconference '83 suggests to me that I am speaking to people ready and able to provide that leadership.

Teleconferencing is certain to play an important role in the telecommunications system of tomorrow. It has only just begun to influence the way we now do business.

Even in its present stage of development, it is an important corporate communications resource, offering such benefits as cost and energy savings, improved productivity, and the potential for more effective interaction among participants.

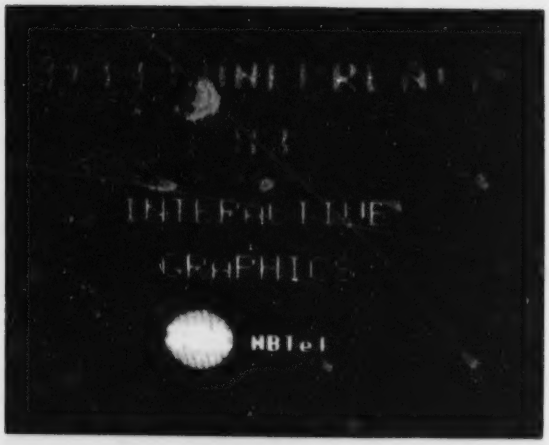
I am sure you will discover in the course of this conference, if you haven't already, that those benefits are not just future projections but present realitites. And that's why I'm saying, in closing a talk on the future, that teleconferencing is in fact "Today's Way to Operate".

Thank you.

INTERACTIVE GRAPHICS

James T. Baker
Market Planning Supervisor
New Brunswick Telephone Company

[Presented from St. John, N.B., using audio-plus teleconferencing.]



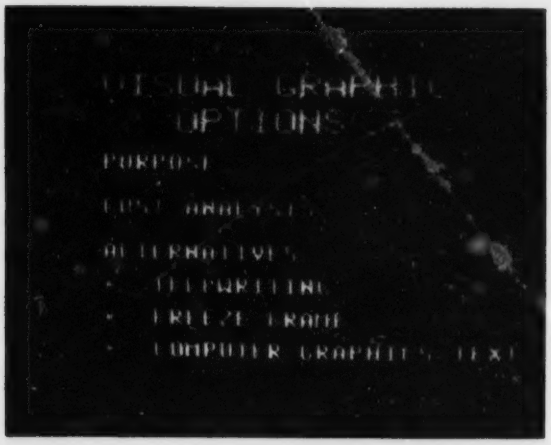
We assemble in a conference or meeting at a location to:

- Discuss
- Interact
- Plan
- Exchange Information
- Educate
- Review Activities
- Identify Problems
- Develop Solutions
- Make Decisions
- Negotiate

To accomplish our objective, we often use:

- Audio
- Visual Aids
- Graphics
- Slides
- Easel Chart
- Chalkboard
- Agenda
- Handout

Only recently has technology provided us with new methods to communicate using our visual sense in teleconferencing situations.



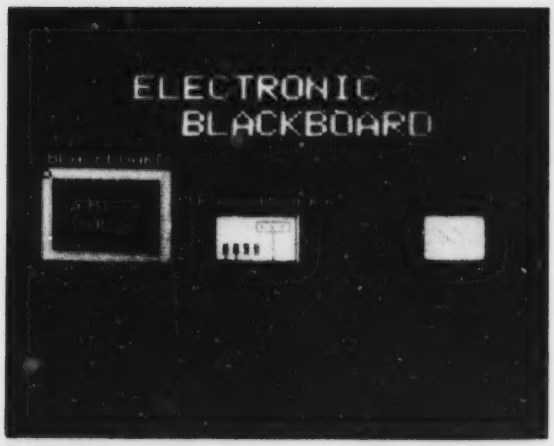
Visual communication aids in polished form, such as dichrome or diazo slides, can cost as much as $10.50 each in a Montreal photo shop, or approximately $2.50 each from your company Visual Graphics Centre at a fully allocated cost. Photocopy of handout material can run as high as 24 cents a page at commercial outlets. For multi-point distribution of visual graphic material, there are several steps in a logistical sequence to be followed, and a slight delay in any one of them can spoil a presentation:

- Prepare material up to two weeks in advance
- Edit and submit corrections
- Prepare for and deliver to destination(s)
- Obtain projection equipment
- Timing of advancing viewing material
  Next slide...Next slide
  Lack of chairman control
- Return material for storage

TELECONFERENCE ENHANCEMENTS OFFER AN ALTERNATIVE

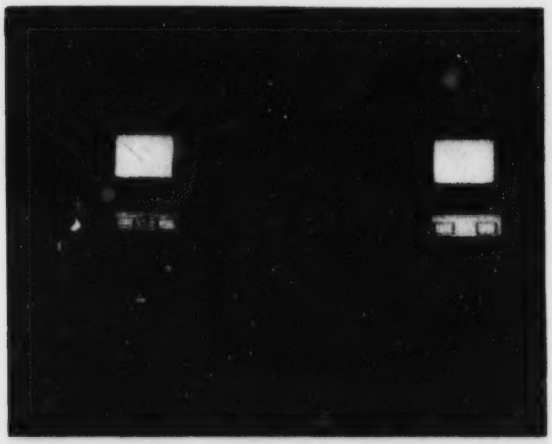
Facsimile

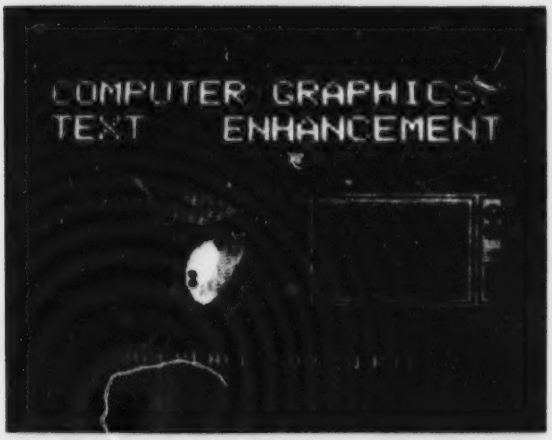
- Faster
- Higher Resolution
- Automatic Receive

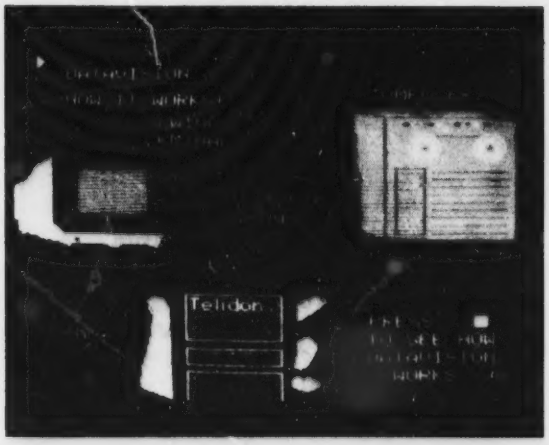


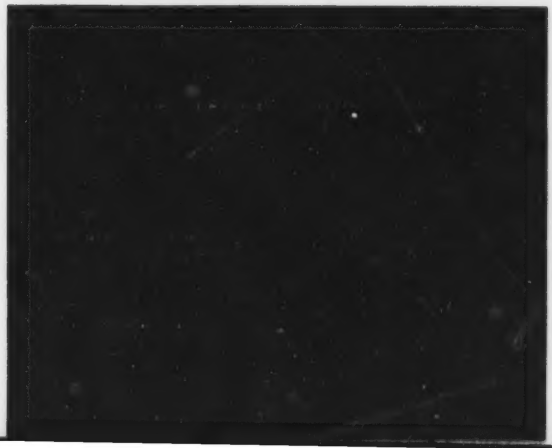
Telewriting

- Real Time
- Two Colours or B&W
- Memory and Storage
- TV Display Format
- Wide range of products from Telewriter II, Gemini 100, Home Computer graphics package







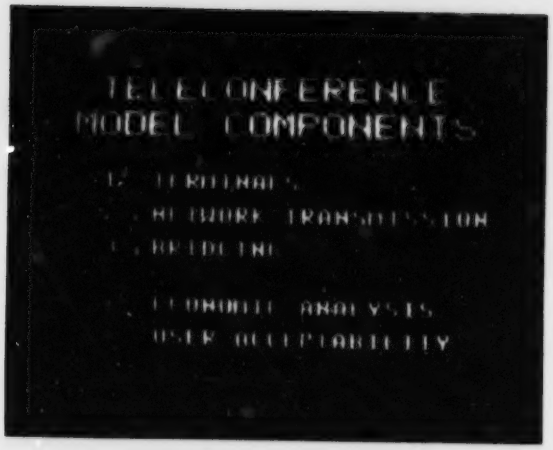


Freeze-Frame

- Low cost video without the motion
- Monochrome and colour options
- Variable speeds and resolution of picture reproduction
- Very flexible, people, graphs, charts -- anything a camera can see
- Additional memory available (4 pages)
- Tape record pictures
- Camera and Lense selection very important

Computer Graphics/Text Enhancement

- High profile Telco service development
- Software dependent (user's choice)
- Telidon resolution may be minimum that is acceptable to user
- Chairman control
- On-line editing
- Information transfer and storage
- Private system -- i.e. Conference 5XX from Manitoba Telephone System
- Shared service -- account number + password
- Datapac access means low costs for transmission



Teleconferencing systems have 3 essential components:

1. Terminals
2. Network Transmission
3. Bridging

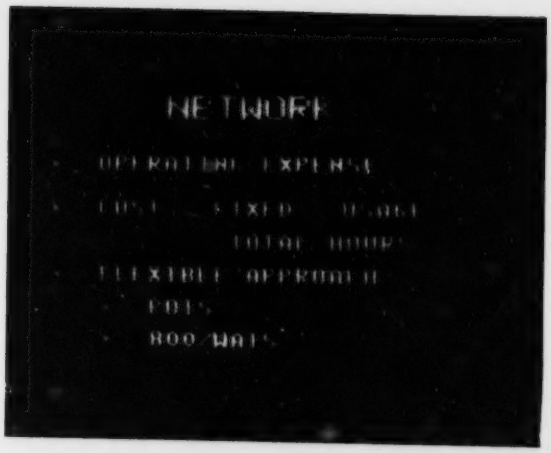
Strategy:

- o Develop models on these 3 key cost areas.
- o Rent/lease at first with purchase option where possible.
- o Develop audio first then examine enchancements.

VISUAL/GRAPHICS SELECTION CRITERIA

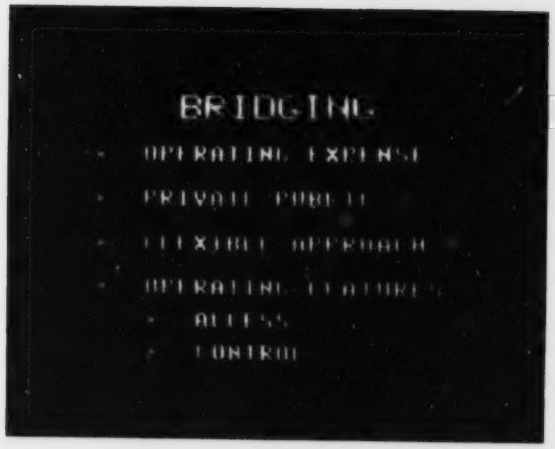
Terminal Selection:

- Generating information, format, preview
- Transmit only, receive only and transceiver
- Storage and retrieval
- Display method -- TV (monochrome, colour)
- Permanent and portable -- mobility
- Terminal supplies, ink, chalk, paper, etc.
- Memory for comparative analysis
- Control of visual information (chairman)
- Compatible with other potential users
- User friendly design
- Security of information
- Display build time
- Resolution
- Meeting room design
- Peripheral items -- cameras, recorders, etc.



Network Selection:

- Telco terminal attachment policy
- Electrical standards of province
- Modem interface and data coupler requirements
- Jack-ended telephone lines
- Rotary dial and touch tone service
- Flexibility -- switched network vs private line
- Existing Inter Exchange Services -- FX, WATS, tie lines
- Estimated usage/costs
- Low grade transmission = possible interference



Bridging Selection:

- Automated with central administration
- Attendant controlled
- Trunking costs for line termination
- Voice switching in bridge -- automatic gain control
- Meet-Me and Dial-Out ability
- Security features and control
- Line size capacity or # of parts
- Private/public services
- Growth requirement -- additional parts/bridge
- Costs per hour of usage

Several teleconferencing models can be designed with the costs calculated quite accurately. These 3 cost areas will assist you in model development.

APPLICATION OF TELECONFERENCING IN GOVERNMENT OF CANADA

H. L. Macumber
Manager of Engineering
Division of Development & Engineering
Government Telecommunications Agency
Department of Communications, Ottawa

Objective

The objective of this paper is to provide a brief overview of

- existing teleconference services provided to the federal government by the Government Telecommunications Agency (GTA)

- some results of teleconference trials undertaken by GTA

- GTA's plans for future evolution of its teleconference services

Background

The mandate of GTA is "to plan, establish, and manage telecommunication facilities and services that will satisfy the requested needs of federal departments and agencies on an economic basis." To this end, GTA offers the following services to the federal government:

- shared voice services (local and intercity)

- shared data services

- teleconferencing services

- electronic messaging services

- consulting services (in the area of telecommunications planning and management)

- directory services (publication of telephone directories for the Government of Canada)

Current GTA Teleconferencing Services

GTA provides teleconference bridges at a number of locations across Canada which are available for use by federal departments and agencies on a shared basis. The regular teleconference service has been in operation for several years. It is similar to the Bell Canada Conference 100 service, in that a GTA operator places calls to participants at a prearranged time and connects them to the bridge. Recently, a new type of bridge has been introduced which allows "meet-me" conferences to be held. This is similar to the Bell Canada Conference 300 service or NB Tel Direct Dial Meeting Service. The Chairman reserves the use of the bridge from the GTA operator. At the prearranged meeting time, the participants dial into the bridge and are automatically connected. Alternatively, the Chairman may dial the participants himself, without operator intervention.

In addition to the above, many of the Government of Canada Consolidated Telephone Systems across the country provide Centrex type teleconferencing features such as "three-party add-on" and "six-party conference".

On average, the number of teleconferences per week using the Ottawa bridge is in the range of 15-20 as shown by Figure 1. The apparent decrease in number of teleconferences shown here may be attributed to the introduction of teleconference bridges at various regional locations which has reduced the demand for the Ottawa bridge.

GTA Enhanced Teleconference Services Trial

This trial, which lasted from November 1982 until February 1983, involved the demonstration of various types of enhanced teleconference systems to representatives of various federal departments. By 'enhanced' is meant the use of audio plus some form of image transmission. The objective was to test various service configurations, to test user reactions, and to test procedures for the operation of such a service.

Conference rooms at GTA or Telco offices in Moncton and Saint John, New Brunswick, Halifax, Nova Scotia, St. John's, Newfoundland, and Ottawa were equipped with an NT2000 teleconferencing terminal, a ROBOT freeze-frame video system, a Telidon display unit, and an Infofax DEX 3500 facsimile terminal.

Teleconferences were set up between these locations using meet-me type bridges in Moncton and Halifax for voice and freeze-frame. The NB Tel data bridge was used for Telidon. Facsimile calls were established on a pointto-point basis. In each case, the Federal Government Intercity Voice Network was used.

Trial Results

Fifteen demonstrations, in total, were provided to federal departments. A questionnaire was distributed to attendees who were asked to complete and return it following the demonstration. Unfortunately the return ratio was fairly low. Of the approximately 400 persons who attended, 49 returned the questionnaires. Moreover, not all who responded completed all parts of the questionnaire. Consequently, the results presented below should be considered as only general indications of user reaction.

Of those answering the questions, 52% indicated they had participated in previous audio teleconferences while only 11% had participated in other video teleconferences.

Attendees were asked to indicate:

- What percentage of face-to-face meetings they felt could be replaced by audio teleconferencing. The response is shown in Figure 2. If these figures are considered on a cumulative basis, 71% of respondents felt that at least 20% of face-to-face meetings could be replaced, while 18% felt that as many as 50% could be replaced.

- Their rating (excellent, good, fair or poor) of the ease of call set-up, ease of operation, and quality of the audio. freeze-frame, and Telidon systems demonstrated. Figure 3 shows the percentage of respondents who replied either good or excellent in each case. As can be

seen, there was no significant difference in the ratings for ease of call set-up or ease of operation between the three systems. The Telidon system received a higher quality rating that the freeze-frame, most likely because of its use of colour and effective graphics. However, as will be seen later, this did not necessarily translate into a perceived need for the system.

- Which of the teleconferencing services they would be likely to use in the future. The responses are shown in Figure 4. As expected, voice was chosen by the majority since it is an essential component of almost any teleconference. Freeze-frame was the most popular choice as an image transmission system, likely because of its flexibility. Surprisingly, facsimile was selected by more respondents than Telidon.

- In what percentage of teleconferences they would be likely to use freezeframe or Telidon. The responses are shown in Figure 5. As can be seen from this figure, the vast majority (67%) felt that Telidon would be useful in no more than 10% of teleconferences, while 8% felt that it would be useful in more than 60% of teleconferences. The responses for freezeframe were more evenly distributed. Sixty-six percent felt that freezeframe could be useful in at least 20% of teleconferences, although no one felt freeze-frame would be useful in more than 60% of teleconferences.

Attendees were also asked to rate the inconvenience of having to travel to another building to participate in an enhanced audio teleconference. The response is shown in Figure 6. Fifteen percent said there would be no inconvenience, 51% would find it slightly inconvenient and 12% felt it would be very inconvenient although they would do it. Twenty-two percent would hold only a voice teleconference to avoid travelling to another building.

GTA Plans

GTA plans in the area of teleconferencing services are:

1) To continue to offer national and regional audio teleconference bridging services to federal departments on a shared basis.

2) To continue efforts to increase the awareness on the part of federal departments of the benefits of teleconferencing and the availability of GTA teleconferencing services.

3) To encourage the use by departments of teleconferencing enhancements such as Telidon and freeze-frame.

4) To monitor departmental plans for consistency with GTA plans.

5) To equip centrally located conference rooms for audio and enhanced teleconferencing.

6) To examine feasibility of compressed video in conjunction with the development of satellite communications network services.

Figure 1

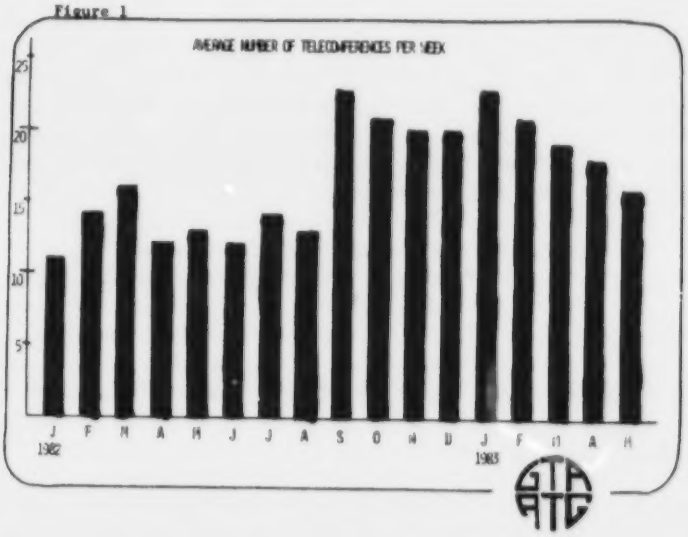


Figure 2

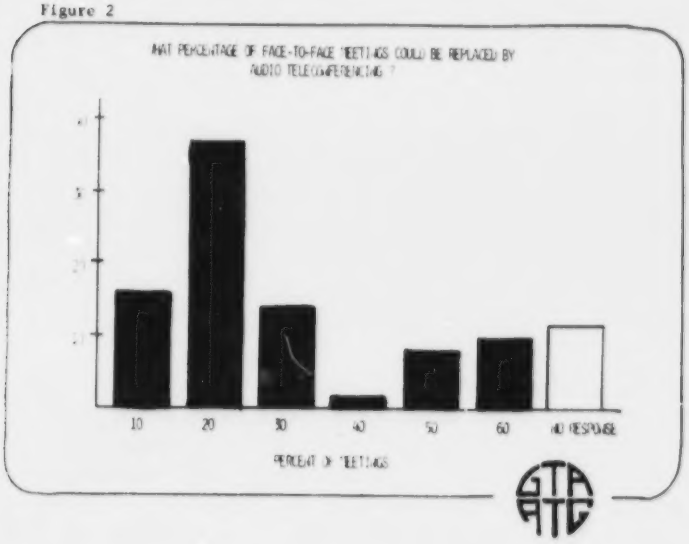


Figure 3

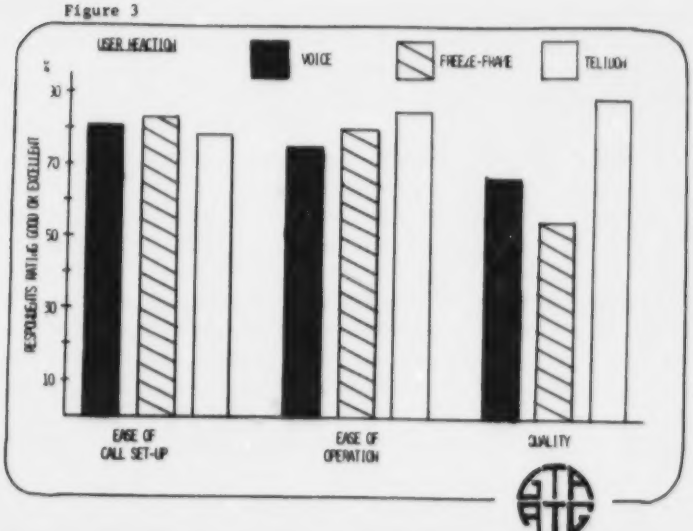


Figure 4

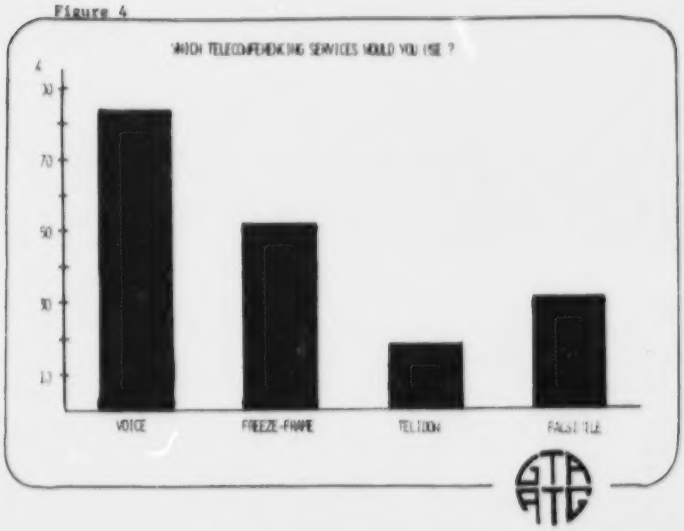


Figure 5

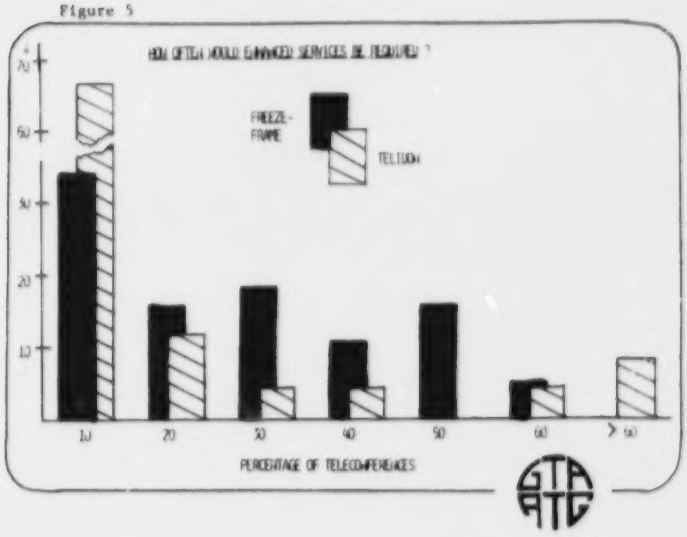
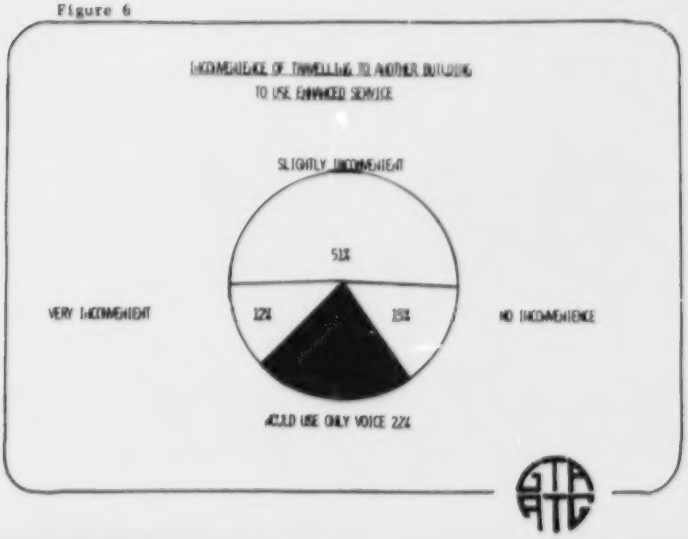


Figure 6



TELEMEDICINE IN NORTHWESTERN ONTARIO

Dr. Earl Dunn
Family Practice Unit
Sunnybrook Medical Centre

This is a case study of a telecommunications system, but before I present the actual study, perhaps you would like to transport yourselves in your imagination to Northern Ontario, at forty degrees below zero. Flying north over this very desolate and barren area, you may look down eventually and see a small number of communities scattered below. You land, then are taken ill, or have an accident -- and you discover that there are no hospitals, or doctors. Whom do you go to for your medical care?

Most of the larger communities will have a Nurse's Station, staffed by specially trained nurses, who provide over 90% of the health care. These people do not have access to the large centres and the sophisticated equipment that we are all used to. Since the early 1970s, with other people, I have been looking at how communication technology might help in delivering health care to these areas. Most notably, I have been working with Dave Conrath and Chris Higgins of the University of Waterloo.

What I am going to describe to you now, very briefly, is a system that we have been evaluating over the past five years. It is a system that was developed to meet the needs of the people in the Sioux Lookout Zone -- an area in Northwestern Ontario, which covers about 385,000 km^2, and holds about 10,000 people. It has 27 isolated communities, only one of which is on a road. Fort Severn, for example, which is in this area, is about 1000 km from the nearest hospital.

In 1977, we were involved in the installation of a slow scan system, which was located in eight different units. Two were installed in small communities that do not even have nurses -- only a health aid station within the school, three in small nursing stations covering populations of approximately 500 to 1000, one in the local zone hospital, and two in Toronto (one in Sunnybrook and one in the Hospital for Sick Children). It must be emphasized that the territory encompassing these eight different locations is very wide-ranging. The system that was introduced was a slow scan system, consisting of two regular dial-up telephone lines, with a picture transmission in about 79 seconds. Both of the Toronto units have now been put on wheels, so that they can be moved around the hospital and used in different locations. Another unit, located in one of the northern communities, has actually been run off a portable Honda generator, with no difficulty. It was necessary to do this because the community had only one power generator in the school, which was turned off in the summer time.

We were interested in looking in detail at the effects of this system, and we introduced a method to gather data on all health encounters in all 27 communities in the zone. We documented all types of communications -- those effected using the slow scan or freeze frame system, and also those made through the use of the telephone and high frequency radio. In this way, we obtained data on all communication systems, not just the slow scan system.

Generally, about 50,000 health visits occur per year, and we have data spanning a five-year period. That is to say, we now have data on 250,000 patient contacts with the health system, among which about 15,000 were

by electronic means. Again, it must be emphasized that these contacts were not only made by teleconferencing; by far the majority were made by means of high frequency radio and ordinary use of the telephone. I will not discuss all the data, but will confine myself to describing the utilization of and attitudes towards the slow scan system. I will also touch briefly on the effects and the cost benefit analysis of this system.

As far as utilization is concerned, the first question which arises is -- what were the transmissions used for? According to our data, gathered over three years, the system was used over 1000 times. Thirty-five percent of uses were for medical consultations, 37% for education, 25% for social therapeutic reasons. In the medical area, the most common transmission was for X-rays, and there were over 50% for this purpose. We transmitted E.K.G.s, skin rashes, burns, microscopic slides, physiotherapy slides -- and the system was also used for dental and other purposes. The most common use was for trauma, including accidents, gunshot wounds, stab wounds. In addition we could confer, in this way, on a number of medical conditions.

There have been numerous educational uses. Since 1978, we have used the system for regular educational programs, including ordinary rounds, special programs, in-service education and patient education. As there are whole sessions on education at this conference, I will not cover this in detail. Starting in 1978, using the Bell Canada Conference System, we did multi-point educational programs. In the last year, we have been using the Darome Bridge, earlier described by Judy Roberts, for our educational programs.

These, then, are the uses we have made of the teleconferencing systems. Now we can consider the findings of the extensive study we carried out on the effects of the system and the cost benefit analysis. We found that many of our initial ideas were simplistic. For example, we thought at first that the use of the system would prevent either professional or patient transfers. In fact, our effect on the transportation system could be classified in four broad categories. We prevented some transfers. Some transfers became necessary because of the system itself. Some took place in different ways -- for example, using a scheduled rather than a chartered aircraft, which is three or four times less expensive. Some transfers were in different directions -- obviously all this precluded a simplistic way of looking at the issue.

The cost benefit assessment was not simple either. In some areas we saved money, however, in other areas, more money was spent. For example, for respiratory trauma, the system increased the costs. On the other hand, in areas of respiratory disease, costs were reduced. Overall, it evened out -- so that the introduction of the system did not save money. Did it improve the quality of medical care? As Judy Roberts mentioned, there is real controversy as to how you would measure this. We have been able to show that we altered medical care; that doesn't necessarily mean that we improved it.

We were also keen to gauge the attitudes of the providers and the people who were going to use the system. This system was designed to be used by the doctors and nurses, already working in the field, delivering health care. There were no operators of the system in these remote areas -- therefore, the nurses had to do their own troubleshooting and their own repairs. Understandably, in the beginning, they were against the idea.

After the system had been installed for over two years, we collected data on the attitudes of 38 nurses and doctors -- all of whom had hands-on use of the system, and in fact had to set up their own system and use it on their own. We did a comparison between their initially stated attitudes and their attitudes two-and-a-half years after the system was installed. We found that after two years, the attitudes had become more positive. All four doctors, who were in the area at the time, were more positive than at the beginning. Amongst the nurses, there were only a couple of who became more negative; most of them became more positive. As part of the attitudinal survey, we asked them what they thought the main use of the system was. Educational programs were cited as being of most value, the social-therapeutic programs were ranked second in importance, and in fact, medical consultation and medical backup and transfers, although highly rated, were deemed less valuable than the others.

What, exactly, is meant by social-therapeutic? Remember, 25% of our transmissions were used for this purpose. Here are some examples. We transmitted pictures of newborn babies back to their families, for those mothers away from their communities. Patients, who sometimes had to travel 400 or 500 km from their homes for hospitalization, were able to have conferences with their families back home. We had one instance, where a patient was in Toronto for investigation. She did not speak English well. When her investigations were completed, the doctors wanted to do surgery. We actually linked her doctors and the patient in Toronto with the doctor in Sioux Lookout, and with her brother and a nurse in one of the northern communities 1500 km away from Toronto. The patient's brother spoke fluent English, and the doctors were able to explain to him what the problem was, why they wanted to do surgery, and what kind of surgery. The patient, using her brother as her interpreter, was actually able to sign her informed consent for her surgery in Toronto, without leaving the city. Without the system, it might have become necessary to send her back to her own community before doing the surgery.

In our attitudinal survey, we also asked people how much benefit was derived from the video portion of the system. The doctors and nurses differed in opinion on this, but all of them felt that some benefit was had. Tied to the system as we had become, we nevertheless posed the uncomfortable, but crucial question to those users having two years experience with the system: if they were the administrators of a similar set-up in the north, would they install the system? None of the doctors said they would definitely do so, although two said they would introduce it, with reservations. Of the nurses, 75% of them who gave an opinion, said that they would install it, were they administering the system.

In summary, our five year study of this system has shown that it clearly alters the manner in which health care is delivered. From an original cross-sectional analysis we did, it appeared that the system was cost beneficial. However, more recently, a five year longitudinal analysis of the changes in all of the communities -- both those with, and those without the system -- was made. It was discovered that the differences in cost brought about by the system were not statistically significant.

On the other hand, we did show that there were differences between the costs and the effects that related to the type of health problems. There were significant educational benefits of the system, and attitudes became increasingly positive towards it, with the nurses being more positive than the doctors. After six years, in spite of the fact that the nurses and the health care workers have to troubleshoot and deal with the tech-

nical side themselves, the system is still operating. In fact, all of the units are still operational, and this is a true reflection of the need and the desire for the system. In the final analysis, it becomes clear that teleconferencing systems are needed in the northern areas to assist in health care delivery. In these areas they are justly appreciated.

FULL-MOTION VIDEO

Jacques Kirouac and Mario Rodrigues
Bell Canada

[Presented from Montreal, using full-motion video teleconferencing.]

Full-motion video is easy to use because it is the one form of telecommunications which most resembles face-to-face meetings.

We would like to introduce to you some of the video conferencing services that are a part of the teleconferencing family of services offered by Bell Canada. The first one is "Conference 600", which provides two-way video conferencing between two points. This is a full-motion video service, which has very high quality audio, higher than any telephone conferencing service. It has full colour and full interaction on the video -- this means that you have two-way video communication between the two locations. As was previously said, the full motion video is very user-friendly. People will choose Conference 600 when full audio and video interaction are required; for example, when it is desirable to see the reactions of the participants in the meeting. It's normally suitable for groups consisting of two to eight people at each location. It may be used for regular business meetings, in the day to day operation of business, and it is suitable for both intra or inter-city meetings. Also, video-conferencing can be set up in your own business location, and this gives it greater flexibility.

There are certain characteristics of Conference 600 which should be discussed further. Video conference rooms are required at each point where the conference is taking place. Customers might have these on their own premises. They might be Telco conference rooms; or they might be public conference rooms located in hotels or in key business areas. The picture processors are located on Telco premises and they are shared by users, one at a time. There is a core network already dedicated to this system which will be expanded as the demand for the service grows. We are planning to cover most major Canadian cities initially, but as the demand warrants it, the network will be expanded.

The service is point-to-point, as opposed to point-to-multi-point and, as with other Telco services, a very basic level of security will be offered at the start. There is a video conference room at location A and location B, with analogue local access to the picture processor on Telco premises. The inter-exchange facility is provided via satellite in some cases, or terrestrially in others, and the service is co-ordinated via a central reservation system.

There are many applications for Conference 600, but I will give only a few examples here. The service can be used for sales campaigns. For example, brochures, product ads, packaging etc. can be depicted via the service. During the meeting, 35mm slide presentations are also possible. Engineering illustrations and drawings might be depicted and then even modified, changed and checked for quality -- all from a distance. The service can be used for staff and line meetings, where charts and other visual data need to be presented. Some organizations have even used teleconferencing for holding preliminary personnel interviews.

Conference 600 is one of two video-conferencing services offered by Bell. The second one, called Conference 650, is a point-to-multi-point, or one-way video service. This means that the video will go from one originating location to many receiving points. Since this is a teleconferencing service, there should be, and there is, an interactive portion; this is found in the audio. Two-way audio is provided to all locations, so people in all locations are able to receive or transmit. This enables each location, for example, to ask the chairman questions and to receive a 'direct' answer. This service, as opposed to Conference 600, is particularly suitable for large group meetings, where there can be from twenty to two hundred to two thousand people in each location, and the only thing that will change is the size of the receiving monitor. It is also a service which is free from any constraint caused by geographical limitations. It can be used nation-wide, across the border, or internationally. Facilities for the service are similar in some ways to those for Conference 600. However, instead of small monitors and a few cameras, which are all that are needed for Conference 600, Conference 650 requires hotel meeting rooms with large screen projectors. Conference 650 also differs in that it may involve several groups receiving the one-way video. Consequently, it is very suitable for such events as teleconventions or shareholders' meetings. It can accommodate association meetings, where many participants who normally would not travel to a gathering, due to time or money constraints, may in this way attend. It's also being used for press conferences, and educational purposes, such as tele-teaching. As well, it has been used, and is still being used, in the United States for religious events.

The benefits of teleconferencing can be seen by returning first to Conference 600 to underline some of the special benefits of that service. The visual interaction and feedback and the ability to show and modify graphic material, or even products or models, are the key features and benefits of the service. It comes closest to replacing meetings made in person, and consequently requires only minor changes in the way individuals hold business meetings. In addition, with minimal training, people become very comfortable with the medium and take advantage of the service very quickly.

There are many benefits for the user in various areas. For example, in business, there are potential savings in travel and lodging costs, depending on the number of people travelling. There are also potential improvements in productivity; meetings tend to be shorter and decisions reached faster because people are more aware of time. In the case of corporations, the service provides the ability to meet at short notice and may give companies a competitive advantage. Real estate developers who respond to the new systems and construct public rooms in business areas could have a competitive edge as well. In the case of hotels, the Canadian hotel industry could follow the example of the Holiday Inn network and could set up multi-purpose teleconference room networks. This would increase hotel-room occupancy and would boost the hotel industry.

Of course, the question arises: what is the cost of these services? In fact, the cost is very reasonable. If teleconferencing -- for example the two-point service -- is used to replace travel meetings, there are many savings in money and time as well as other side benefits. Consider the figures. Suppose that a meeting is to be held between conferees from both Toronto and Montreal.

Three people, for example, will travel from, or to, either of these points. This would involve about five hours travelling. If we estimate the cost of the lost time at $31 an hour, this would give a total cost of $465. To this must be added the price of the airfare, taxi and meals. A total cost of $1,300 would be incurred. If you use video teleconferencing, a typical transmission for Toronto-Montreal is $172 an hour; in addition, there would be a charge of $100 per room. This would give a total cost of $544. The service in this case, therefore, saves $756. In addition, if you use video conferencing, you don't pay more for extra participants, whereas you pay additional airfare costs for each additional person who takes the plane.

At present Bell Canada has studios available in Quebec City, Montreal, Ottawa, Toronto and London, but also offers the service in Hull, Kingston, Oshawa, Sudbury and Thunder Bay.

The service, besides being available in Bell Canada territory, is also available in Alberta, between Calgary and Edmonton. However, we plan to expand these regional services and connect them, so that they will be available across Canada, starting late this year or early next year, depending on approval by the regulatory bodies. We plan to use digital technology and satellite transmission where applicable and the intent is to go to a planned digital network. Right now, we have a commercial trial on-going with France and the United Kingdom. The transmission is analogue, but again we are looking at interconnection with the United States and overseas through the appropriate carriers. In 1984, when we introduce the Trans-Canada service, we plan to go to the key cities, namely Vancouver, Calgary, Ottawa, Edmonton, Toronto and Montreal, and then this service will be expanded to other cities. Again, this plan is dependent on the demand for service, and might change.

Both Conference 600 and Conference 650 are of great value, in different areas. Certainly, use of these and other teleconferencing devices is expanding rapidly and in time will be as familiar to us as the telephone.

Note: Telecom Canada's first national Conference 600 service was introduced in September 1983. The service is now available in Toronto, Calgary, Edmonton, Vancouver, Victoria and Winnipeg. Ottawa and Montreal will be available, on a Telecom Canada basis, in 1984.

TELECONFERENCING AT IBM CANADA

Ed Pryzdial
Advisory Analyst
IBM Canada

Up to the present time, numerous definitions of teleconferencing have been suggested. I prefer the definition which, I believe, originated in the Bell labs in the United States. This very simply is, "two or more people communicating remotely with each other via electronic means."

If you look at a typical office environment, the range of communication methods is extremely wide. At one extreme -- let us call it the extreme left -- there are the basic forms of communication, the written memorandum or letter. At the other extreme -- the right -- there is the full face-to-face confrontation or, as my confrere from the United States likes to call it, the touching of warm flesh with all the connotations that that has. The 'distance' between these two extremes is now increasingly being filled by teleconferencing.

For example, moving a little to the left of the face-to-face confrontation along this communication continuum, you have full-motion, full-colour video. The following anecdote will illustrate how effective this is. I was at a rather interesting teleconferencing meeting between IBM Headquarters in Toronto and Montreal. It was quite an informal meeting and inadvertently somebody in Montreal picked up a cigarette and without even thinking said, "Do you mind if I smoke?". This is not an exaggeration and I think it illustrates some of the capabilities that you can have with full-motion, full-colour. (By the way, our full-motion, full-colour studio can capture not only the people image, but documentation from an overhead camera shining down right on top of the table, and also from a camera focusing on the flip chart.) However, there is a price to pay. You have to have a fairly good lighting system, a good room and, for the acoustics, some portable studios or even full-blown television studios.

To the left of full-motion, full-colour, along the communication range, is the black and white freeze-frame system. It is substantially cheaper than the full-motion colour studio, simply because the lines of communication are substantially cheaper. An ordinary telephone line may be used for both the video, data transmission and regular hook-up, whereas the colour system requires a much more expensive line. Because of this, the freeze-frame system is more widely used. IBM in the United States already has over thirty operational studios in use over fifty percent of the available office time and usage is still expanding. In approximately one year's time, roughly sixty studios will be in use. This figure does not include studios in remote places such as Fujisaw, Japan, France, England, Australia and so forth.

Next along the communication range, still moving to the left, is the electronic blackboard. This is another augmentation of teleconferencing, which can be used for "chicken-scratching", or very fast calculations, in a remote presentation to the other party. I firmly believe there's a place for it, but right now, as far as our plans are concerned, it is in the future.

A form of teleconferencing that many people don't take into consideration is facsimile. This is especially useful at a meeting, for example, where what the speaker says may be presented in advance, in written form. It's not very cost-effective to have a facsimile device outside everyone's work station, so we normally limit these devices to particular areas in the office building. But certainly they are appropriate to teleconferencing facilities and indeed IBM in the United States is installing facsimile machines in the equipment room, which adjoins the teleconferencing room.

Next to this we have what is possibly my favourite form of telecommunications: computer conferencing. Probably only large companies can afford a studio, or other sophisticated equipment, needed for the more elaborate forms of teleconferencing, but almost any company can own, or does own, a computer. The data processing industry is growing so rapidly now that the terminal to head count population ratio, particularly out in the field, is increasing at a fantastic rate. Right now in our own company in Canada, our telephone to head count ratio is approximately 1.2 to 1. By comparison, our terminal to head count ratio for our field personnel is about .6 to 1 and by 1985, we feel, will be 1.2 to 1. Computer conferencing is obviously easier to arrange and it has numerous applications. Most of the presentations or meetings we have, except for ad hoc ones, are of a somewhat formal nature. Usually a presentation is made with charts or 'foils' used as illustrations. What could be better than preparing the foils on a terminal, at your own leisure, in your own office? All that is then needed is a simple audio connection. Audio, in fact, is the one link that is of paramount importance. It is the common thread in every last possible manifestation of teleconferencing.

IBM has recently announced a new addition to its computer conference systems: the Audio Distribution System. It's a rather interesting voice-message gathering and transmission system and it has some very interesting characteristics which I won't describe in detail. Something that I rather enjoyed was an early attempt by my Director to use the Audio Distribution System. One of its features enables you to send messages to yourself as reminders. He was travelling and staying in the Ryetown Hilton Hotel, near New York City, so he thought it would be a good idea to use the system as a wake-up call, for the next morning. He dialed the appropriate number, made up his message, and went to bed. What happened then is that a synthesized voice came on at the exact instant of time that the director told the system to go on the air. The problem is that the computer asks for identification. The system dutifully called the Ryetown Hilton number and to the "Good morning, Ryetown Hilton", the computer voice 'replied', "Please identify yourself." Click. Exactly five minutes later, the computer came back again: "Please identify yourself." This went on for some time. The Director, by the way, slept in.

Computer systems today, then, may include the audio-distribution system, which I have just described, the terminal, and graphic capabilities obtained either by using some device like Videotex or Telidon, or a graphic system which can be invoked from your own computer system via the terminal.

The same devices exist in a teleconference room -- only large screen projection is used instead of terminals -- to serve a group of people, as opposed to an individual. The teleconference room is often used for communication between small branches of the company and Head Office. It may be a one-on-one, for instance an office to an office. But in all probability, if people have something to communicate, they either want to solicit approval, or report on a marketing situation or a technical problem. Therefore at the other end, at the Head Quarters or the supporting location they may want to assemble more than one person. This is where the teleconference room comes in. We have six projection units installed in the Toronto area and two full-blown conference rooms in Toronto and Montreal. The second one, recently added, has provisions not only for a computer with a large screen projection system, but also for the black and white freeze-frame system which our United States corporation uses. By the flip of a switch, we hope we will eventually be able to switch over to full-motion full-colour, but that will only happen if and when TCTS and Bell Canada strike up the appropriate rates so that they are of price performance benefit to us.

Finally, in the communication range, there is the portable video system. This does not have its place in a teleconferencing studio. With its high portability it can be moved to an office, or a work-station, so that you can have instantaneous ad hoc conferences as required.

It is obvious, then, that in-between the memorandum and the face-to-face confrontation there is a myriad of devices. IBM is convinced that teleconferencing is the way, not only of the future, but of the here and now, and the overall strategy is to prepare ourselves now and for the future, by getting together a teleconferencing network. We want to supply some electronic ways of communication so that people needing to communicate have the best possible devices to do their jobs. We hope thereby to increase productivity, and save money and time, by reducing travel.

Does teleconferencing really save money? To answer this question, I thought I'd share with you the cost of our full-motion full-colour system, which operates between Montreal and Toronto. To arrive at a cost-estimate, we recorded the number of sessions held per month and compared it to our expenses, on a monthly basis. These expenses include our fixed charges: for example, the cost of our room, the amortization of our equipment over a five-year period, occupancy cost, the cost of pencils, rulers, etc. There are also variable costs -- what we pay Bell Canada for the connect time.

The first ten hours of the month are charged at the rate of $172 an hour, at the present time. After the tenth hour we get a twenty-five percent reduction in our costs. Taking all this into consideration, our break-even point is about eleven conferences a month. We're exceeding that substantially and anything beyond that point is green hard dollar savings in our pocket. If you include the cost of lost productivity, the savings are even greater. We have averaged, for the past year and a half, about fourteen to twenty-five conferences a month. Obviously then, we are showing a definite increase as far as productivity and dollar savings are concerned.

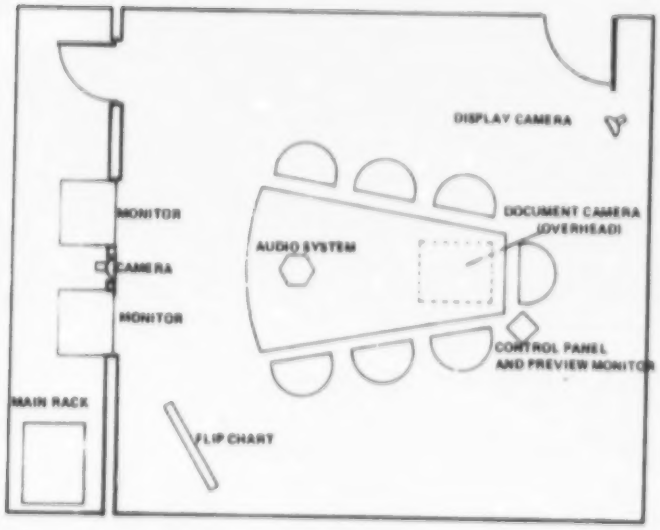
What are the applications of the system? The Montreal region is used primarily for marketing; therefore, we have not exploited all the potential uses of our full-colour studios. However, they have been used extremely productively for regular function meetings, problem meetings, product announcements and for problem determination. We've had proposal reviews and regular monthly or even bi-weekly updates. We're convinced that just the monthly management updates have more than paid for the system if you look at the cost of the time that a Manager or a Senior Vice President spends in an airplane. We've also used the system on an ad hoc basis.

As far as education is concerned, we have run internal courses, given by an IBM instructor to internal IBMers, and we've also tried it on a pilot basis, with IBM instructors located in Toronto teaching a class in Montreal. According to the people who have run the courses and those who attended them, the results were outstanding. Both groups were saved the inconvenience of travel, yet the same objectives were achieved.

We've also had usage in the plant and in construction; the architect or real estate people can have dialogue with others at the other end. Again time and money are saved. It is also used for engineering, regular project review updates and special marketing situations.

I'd like to repeat, in conclusion, the definition of teleconferencing, which I mentioned at the beginning: "two or more people communicating remotely with each other via electronic means." Speaking from a practical viewpoint and after eighteen months experience in our current studios and well over three years in our black and white freeze-frame system in the United States, I can state categorically that there is no question, the benefits of telecommunications are all there for us to use.

IBM STUDIO



VIDEO CONFERENCING

Neeru Biswas
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Telecommunications Services Branch
Ministry of Government Services
Ontario Government

Professionals, management personnel and public officials in the Ontario Government use teleconferencing in various ways to save time, energy and money - money from your taxes and mine. They use it, as well, to improve organizational communications, productivity and effectiveness. The Ministry of Government Services, Telecommunication Services Branch is responsible for providing operational teleconference systems and services throughout the Ontario Government. In promoting and demonstrating the service, we have used an integrated approach. We try not to talk about audio teleconference only or video teleconference only or a combination of the two. Our approach has been: the user's needs dictate the type of system to be used. However, here I will focus on full motion video teleconference applications only.

The Ministry of Government Services has offered full motion video teleconferencing to Ontario Government users right from the start of the program 8 years ago. The need then was for some innovative methods of program delivery in the areas of social, educational, administrative and health services to the residents of Northern Ontario.

Everyone present is acquainted with the large geographical area, the small population, and the isolation experienced in these regions. At that time, video teleconferencing was chosen to be the means of service delivery because it was felt that users would swing to it more easily since it was the closest substitute to a traditional face to face meeting. This human factor was the consideration that we weighted most heavily in selecting full motion video teleconferencing. This decision was made despite the expectation that an effectively conducted audio teleconference could probably suffice in most applications. Studies conducted in the late 70s in the U.S. confirmed this expectation. Only about 10% of all business meetings must be substituted by video teleconference, whereas 40% are substitutable by audio teleconference only.

One of the earliest applications of our full motion video teleconference system was in the area of 'tele-health'. For example, for the last six years psychiatrists from the Clarke Institute in Toronto have provided consultation for patients at the Lake Head Psychiatric Hospital in Thunder Bay. Other professionals have diagnosed and treated speech disorders of patients who live in remote areas. I would like to show you a video tape, made available by the Ontario Ministry of Health, of a speech therapist from the University Hospital in London working with a child at the Sudbury Algoma Hospital. The session on this tape was one of several co-ordinated by MGS working with the Federal Department of Communications who made time on ANIK B available to us.

The Clarke Institute also uses our system to conduct seminars for Lakehead Psychiatric Hospital professionals on various psychiatric and related topics.

The system we use for these seminars is very simple - just a regular conference room with some very basic equipment, no special things other than the obvious cameras and microphones.

Since all visual supports such as slides, blackboards or pad boards are presented as in a regular face to face meeting, very little additional preparation is required for such a presentation by the presenters from the Clark.

Another application for which we developed our one-camera user-controlled system is in the area of executive meetings involving 1 to 4 people at either end. This insures confidentiality of the meetings (our operators are not involved) as well as greater flexibility for the senior executives. It has been our experience that many senior executives like the eye contact and the minimal training requirement which is inherent in full motion video teleconferencing. Without actually travelling, members of the legislature have been able to "be there" for openings of exhibits, including Ontario's high technology centres, and other special events through the use of our system. They have thus been able to participate in the Provincial House of Parliament, save travel dollars and keep in touch with people living outside the Metropolitan Toronto area.

For example, three Ontario Ministers, the Honourable Ministers Leo Bernier, Doug Wiseman and Frank Miller, participated from Toronto last December in the opening of the High Technology Centre for resource machinery in Sudbury.

Our system has also been used for meetings of the Toronto and Thunder Bay chapters of societies such as the IEEE (The Institute for Electrical and Electronics Engineers) and the Ontario Advisory Council for multi-culturalism.

Video teleconferencing is an excellent fall back when travel plans have to be cancelled and it is too late to send out material in advance. For example, managers from the Ontario Ministry of Housing used our system because their flights to Thunder Bay were cancelled due to poor weather conditions. They said they particularly appreciated the full motion video because it was a budget meeting. They had a lot of visual material which they could present on the padboard in Toronto just as easily as they would have done had they been in Thunder Bay.

The system is also used for training on teleconferencing. We have a slide presentation that we use to explain both locally and remotely, in one presentation, how audio teleconferencing (such as the Conference 2000), video teleconferencing, Displayphones and, occasionally, computer based voice mail operate.

Many users keep their teleconference costs down by using video initially for personal introductions. The meeting starts as a full motion video teleconference while people introduce each other. Once this has been done and the human contact has been established, they then continue their meeting with audio only. Most of our users in this mode have been highly satisfied with that application. In a limited way, we've also used this system for conducting job interviews. You can appreciate though that, in the Government,

we have to go through a lot of red tape to get this kind of application formalized. Therefore, it is limited, at present.

In closing, I'd like to say that users' needs or applications certainly should be the most important consideration in system selection. However, once the system is in place, it has been our experience that applications also emerge to support the system. There is no question that full motion video is the Cadillac of teleconference systems. However, the price is not outrageous. We have good working systems which cost only thirty to forty thousand dollars per location. Nevertheless, it takes longer for such a system to break even than it would for an audio teleconferencing bridge, for example. Our bridge has broken even every month since it was operational in March of this year.

We're looking forward to greater utilization of our video teleconference network once Bell Canada can provide tariffed service between northern locations in Ontario. There is a great need for this system there and, fortunately, Bell has promised that the tariff services will soon be available. There is no doubt that the teleconferencing systems can be of great benefit in all areas of government service, without placing an untoward burden on the taxpayer.

MULTI-POINT VIDEO TELECONFERENCING: ELECTRONIC TRAVEL

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This paper addresses the question of multi-point video teleconferencing as an enhancement to professional communication strategies and as an alternative to long-haul travel. Organizations (businesses, associations and governments) can now benefit from satellite technology through instantaneous national or international closed-circuit transmission. The benefits, applications and status of this emerging communications instrument is briefly described, as is a typical model and costing for Canadian sponsors. Special event teleconferences -- often described as 'electronic travel' -- is expected to grow in frequency in Canada and the U.S. at 45% or more annually to 1990.

Although live closed-circuit televised meetings are not new, they are becoming increasingly prominent as a communications tool for corporations, associations and governments around the world. The spiralling popularity of 'electronic travel' springs primarily from increased pressure to improve productivity, eliminate executive downtime, and enhance participation. Such meetings are made possible through satellite technology.

While there are many forms of teleconferencing -- audio, enhanced audio, computer, point-to-point, etc. -- this paper is directed toward what is often described as 'ad hoc' video teleconferences. In contrast to fixed facility teleconferences that join only two sites and are highly interactive, 'ad hoc' teleconferences reach many sites and can involve thousands of participants. These special events involve full-motion one-way video, two-way audio and are delivered through a combination of coaxial cable, satellite and microwave.

In its simplest form, a video teleconference is little more than a live, large-screen television signal delivered by satellite. It resurrects many of the benefits and some of the hazards of live television as we knew it in the 1950s -- any technical or human 'glitches' are seen by all.

But it is also this feature that magnifies the appeal. The realization that the message is live, unedited, and unlikely to be repeated, has been shown to focus the attention of participants. Large screen projection units that make presenters larger than life further enhance dramatic impact and apply a new significance to the message.

The first level of enhanced productivity instrinsic to the medium itself -- real time, enhanced comprehension and retention -- is not the only benefit flowing from the use of satellite video-teleconferencing. Of even more importance is the ability to present the same message, at the same time, to virtually any number of sites in Canada, North America, or around the world (See Fig. 1). No other technique -- bicycling tapes, 'road shows', sales blitzes, conferences -- can claim to reach such a wide representation of a target group or public as can a multi-point video teleconference.

So while presenting a message in a 'friendly', dramatic and productive way, video-teleconferences broaden participation, and allow organizations to target directly to their publics. Teleconference users eliminate long time delays, combat the 'moccasin express', alleviate the sensitivities of those who are the last on the tour, and do so while using their best personnel.

Electronic travel allows the key people, whether they be chairmen, presidents, or marketing executives, to present their message to all who should know, without the requirement of long-distance travel. And because each site is usually linked by return audio, participants can question presenters and benefit from live interaction. Major research shows that most professional meetings are for the purpose of information transfer, with a much smaller proportion being actual decision-making sessions. Today's business environment, involving an increasingly complex decision-making process, suffers from growing communications needs and an expanding requirement for broad consensus and understanding.

Teleconferencing enables professionals to give and receive information, and to act upon it, without the requirement for long-distance travel.

It should not be implied that video teleconferencing replaces the need for face-to-face contact, or that it will even eliminate a significant proportion of business travel. Rather, "electronic travel" provides a further tool that enhances communications and a new means by which to distribute a message. It provides an option to memos, press-releases, restricted briefings and jet lag.

In many cases, a teleconference will occur as a supplement to existing meetings. Rather than becoming the entire meeting, the satellite-delivered portion can be tailored to enhance, expand and dramatize an existing program schedule. This is particularly important for national teleconferences that cross several time zones and must be integrated into varying working periods. In such cases, an Eastern time zone may begin the day with a localized program, while a Pacific zone might use their afternoon period for local presentations, with a satellite teleconference in between. Perhaps the best way to demonstrate the usefulness of electronic travel is to describe its applications:

1) New Product Introductions: The traditional method by which new products are introduced is the 'road show', a multi-media presentation that tours major markets to brief and stimulate sales forces and selected potential clients. Aside from being highly expensive, the medium is time-consuming, wasteful and often defeated by the dreaded 'moccasin express' that affects both target audiences and competitors. The show is often inconsistently presented, suffers from fatigue, and is subject to technical breakdown.

   A corporation that recently introduced its product by teleconference paid almost as much as it would have for its 'travelling road show', but reported that the main advantages were the fact that their computerized product could not be damaged by sending its picture to a satellite and back, and that their best marketing people were seen in many sites at once without being taken from the office for extended periods.

2) Professional Development Seminars: Traditionally, associations and professional organizations have accomplished their continuing education responsibilities by either promoting theme conferences or by dispatching travelling teaching teams. Most such organizations report about a 5% attendance annually, mainly because of the out-of-pocket costs for participants and the lost time of travel. The same organizations claim a 10-12% attendance with a reduced registration fee when a satellite video-teleconference was introduced. User studies reveal a higher level of retention from a teleconference than from a live presentation, for many of the reasons stated above.

3) Press Conferences: Until recently, organizations were forced to rely upon a single press briefing and then an edited wire report, to present their subject nationally. Today, however satellite technology enables many such conferences to be held simultaneously, involving trade press, weeklies and local media. The teleconference medium itself encourages prominent coverage, enhances accuracy and diminishes reliance on abridged wire-service reporting.

4) Annual Meeting: Large organizations with thousands of stakeholders can expect only a small fraction of their public to attend a centralized annual meeting. A satellite teleconference, however, enables interested people to travel electronically to hear, see, and ask questions of reporting officers. Aside from the obvious advantage to stakeholders, the organization benefits by demonstrating its willingness and desire to fully disclose its status to supporters.

In Canada, there have been perhaps a dozen true video-teleconferences (in the one-way video, two-way audio mode) with most occurring in 1982. Currently, no permanent private facilities are established for special event teleconferencing purposes, and users must rely upon common carrier receiving equipment or private transportable units. In that sense, all are 'ad hoc' in nature (see Fig. 2).

More than 60% of all multi-point teleconferences originate in Toronto, 20% in Ottawa, and 10% in Montreal. Toronto is the major receiving site for U.S.-originated teleconferences (91%), while Montreal is the primary receiving site (93%) for Canada-originated satellite conferences.

While the average video teleconference in the U.S. involves about 25 sites, the typical Canadian event includes only 4 receiving sites. The average teleconference has a duration of 3.5 hours and will involve about 100 participants at each receiving site. Using this model -- 3.5 hours, 2 camera production, 4 receiving sites, medium-sized display units -- a teleconference sponsor can expect to pay about $28-30,000 for the event (plus hotel room, food and beverage, and promotion). Excluding those attending the origination site, the sponsor has spent ($70-75 per participant -- far less than most alternatives requiring travel. By doubling attendance (broadening participation), the sponsor will almost divide the cost per participant in half. Since most teleconference costs are "fixed" (i.e. production, satellite cost etc.) additional receiving locations can be added at a relatively low incremental cost and under most models, per participant costs as low as $10 have been achieved in Canada. Electronic travel is not a panacea for all communications problems. However, when properly conceived, with adequate attention to strategic issues, and when organized by experienced people a video teleconference is an extremely valuable and cost effective communications tool.

FIGURE 1

The CTN video-teleconference network . . . a private television network distributed via satellite.

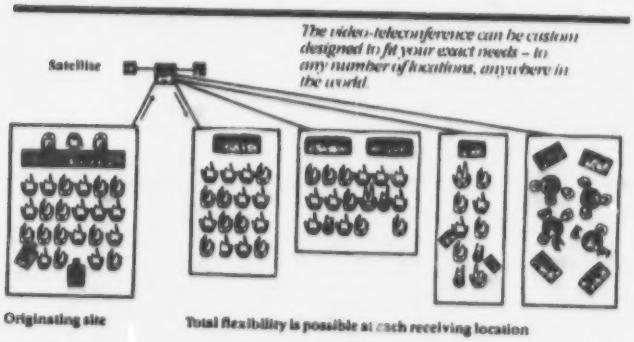
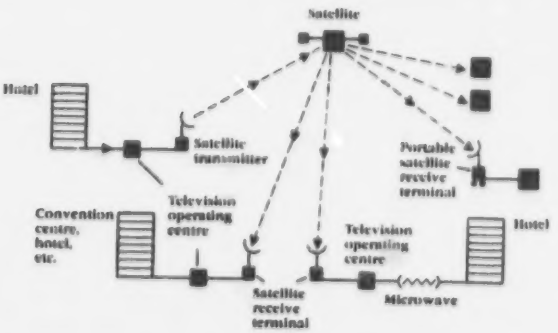

Satellite
The video-teleconference can be custom designed to fit your exact needs – to any number of locations, anywhere in the world.
Originating site
Total flexibility is possible at each receiving location

FIGURE 2

The satellite and terrestrial network.



VIDEO TELECONFERENCING AT THE ROYAL BANK OF CANADA

William Dinwoody
Communications Analyst
Royal Bank of Canada

It is a pleasure for me to be asked to participate in this workshop session on full motion video teleconferencing. For the next few minutes I will discuss the steps leading up to the implementation of video teleconferencing at the Royal Bank; our experience and solutions and the resulting effect of this medium of communications in our organization.

First, I must state that tangible cost justification of video teleconferencing is difficult to determine prior to its purchase and installation. Its true value is primarily recognized after installation and subsequent usage.

However, intangible savings and benefits are incalculable when the potential of increased productivity of participants, rising travel and accommodation costs, time lost commuting to airports, flight cancellations due to inclement weather, and strikes are considered.

Video teleconferencing, the new medium for business, allows conferences to avoid these costly and annoying encumbrances of travel and remain close to their offices where they are needed.

Part of the difficulty selling video teleconferencing to your executive may be in overcoming the very expensive 'toy' image.

In this respect, we were fortunate at the Royal, since our executive already recognized the merits and potential of this service, had been exposed to full motion video in the United States, and requested that an evaluation be undertaken to determine the costs to install and maintain this feature between Montreal and Toronto.

As you are probably aware, our Head Office is located in Montreal. Because of the current financial activity in Toronto, a number of head office departments are located here. This geographic division often presents the problem of persistent travel and high operating costs through lost productivity.

Audio conferencing has been used, and still is, to reduce travel where possible. However, there was a definite need for that 'face to face' environment and extra dimension not available with audio conferencing.

Telco Assistance

When the request to evaluate video teleconferencing was received by the bank's systems development group, Bell Canada was contacted.

Our initial intent was to provide a 'conceptual' feel of video teleconferencing to potential conferees on a regular basis. We knew that Bell had video teleconferencing facilities in Toronto and Montreal. But, to arrange the use of these rooms when needed and have participants go to these locations would not provide the concept we required. Also, there was always the possiblity these facilities might not be available when we needed them.

Our preference was to provide this video teleconferencing facility on our own premises. Consequently, we began discussions with Bell to field trial their portable equipment on our premises in Montreal and Toronto.

Bell were extremely helpful and eager to assist us with the establishment of temporary video rooms. They provided direction and guidance on such areas as lighting dispersement, camera location and table positioning.

Conceptual Environment

- SELECT CONFERENCE ROOM
- ENHANCE LIGHTING
- ARRANGE CO-AX, MOD-DEMOD, PORTABLE EQUIPMENT INSTALLATION
- ESTABLISH GUIDELINES ON CONDUCTING VIDEO TELECONFERENCING MEETING

All the preparation that was necessary was a conference room approximately 6 m x 6 m, enhanced lighting and blackout curtains. In our case, enhanced lighting was achieved by simply changing the cool white fluorescent tubes to warm white (3000°K). Blackout curtains were used to prevent natural light from intruding into the room and avoid colour distortion. Co-axial cable was installed from the telephone riser and Bell engineers installed the mod-demods required for video transmission.

The portable equipment provided by Bell consisted of one camera, a small monitor to view the image being transmitted, a .5 m monitor to display the received image, two directional microphones, and a control panel to adjust audio volumes and camera positioning. This basic arrangement was used regularly, once a week, for several months during which time we experimented with different sizes of TV monitors.

We developed and provided a guideline of 'helpful hints' on how to conduct a video teleconference for participants and the meeting chairman, to ensure full benefits of this service were experienced. This guideline covered such items as, 48 hours advance notice is necessary to secure the facility; an agenda should be prepared to determine the length of conference, instructions on room and facility bookings; trouble report; etc.

Simultaneously, research and evaluation of costs and equipment for a permanent facility continued.

Education

- LEARN ABOUT VIDEO TELECONFERENCING
  - ATTEND SEMINARS AND PRESENTATION
  - MAKE CONTACT WITH COMPANIES AND PEOPLE EXPERIENCED WITH VIDEO TELECONFERENCING DESIGN
- DISCUSS THEIR PROBLEMS AND SUCCESSES
- BECOME FAMILIAR WITH EQUIPMENT ON MARKET
- KNOW YOUR BASIC REQUIREMENTS
- DETERMINE YOUR FUTURE DIRECTION

Since video teleconferencing was almost non-existent in Canada at that time, it was decided a communications analyst would attend a three day conference called "Promise of Multi-Media Teleconferencing" sponsored by the institute of graphic communications in Andover, Massachusetts.

While our main purpose was to broaden our technical knowledge of video teleconferencing, contacts with people from other companies using video were made and proved invaluable. Users from two companies, Proctor and Gamble and the Bank of America, provided insight into their successes and disappointments during the developmental stages of their faciltites.

Implementation

- ESTABLISH BUDGET AND OBTAIN APPROVAL TO EVALUATE
- DETERMINE EQUIPMENT WHICH BEST SUITS YOUR COMPANY'S NEEDS--PRESENT AND FUTURE
- ENSURE SYSTEM WILL BE EASY TO OPERATE
- ENSURE SUPPLIER AND MANUFACTURER ARE REPUTABLE
- CONTROL AND MANAGE PROJECT TO INSTALLATION

After considerable research of cameras, projectors, slow scan vs full motion vs freeze frame, costs, and the conference environment to best suit our needs, the bank chose Adcom Electronics as the supplier and consultant for the project.

Our Goals

- PROVIDE VERY GOOD TELECONFERENCING FACILITY
- MAINTAIN CONFERENCE ROOM ENVIRONMENT
- AVOID 'HOT' LIGHTING
- ENSURE ONE ROOM AUDIO QUALITY
- CAPABILITY OF PRESENTING UP TO NINE PARTICIPANTS ON SCREEN AT ONCE
- AVOID LAPEL MICROPHONES
- WIDE SCREEN IMAGE--ABLE TO BE EASILY SEEN ANYWHERE IN THE ROOM
- ROOM MUST HAVE AESTHETIC APPEARANCE
- SYSTEM MUST BE EASY TO OPERATE

Our plan was to provide a very good teleconferencing system between Toronto and Montreal in a normal conference room environment.

Since a conference environment was our objective, it was decided that a table-length view of participants would be more conducive to our needs. From our experimentation with various sizes of screens on the portable equipment, it was decided that a four foot screen would be adequate. Since we wanted equipment to be as transparent as possible to participants, it was decided that rear projection would best suit our purposes.

To determine the size of the conference and equipment rooms, a number of issues had to be resolved. We had to determine the distance from the rear view projector to the screen, and the height and distance of the camera from the subjects to be viewed.

We arranged a mockup by having a table top cut from plywood by our real estate resources department. In order for the camera to show a normal table image and place conferees in camera range, the table top was cut in a wedge shape. A camera was mounted on a tripod connected to a monitor.

Experiments with the camera at different heights and positions were conducted to determine the best angle to view the participants. The distance of the camera from the participants was a major consideration since we wished to portray a good conceptual image with up to as many as nine people on the screen at once. We also experimented with the camera above and below the screen.

Findings

- The quality of picture was directly proportional to the number of people in the picture.

  9 people--not very good
  7 people--good
  5 people--very good
  3 people--excellent

- The minimum distance of the projector from the screen to present a proper 1.2 m picture image was 1.9 m.

- That the camera positioned above the wide screen would provide the best image possible and present the concept we required.

- The minimum space requirements for the video facility approximated an area of 6 m x 10 m.

Summary of Requirements

GENERAL	'VERY GOOD VIDEO TELECONFERENCING SYSTEM' NORMAL CONFERENCE ROOM ENVIRONMENT TABLE LENGTH VIEW OF PARTICIPANTS
VIDEO	WIDE SCREEN--REAR PROJECTION UP TO NINE PROPLE ON SCREEN 35 mm SLIDE PROJECTION - REAR PROJECTION WHITEBOARD--FOR WRITTEN AND OVERHEAD AVOID HOT LIGHTING
AUDIO	ONE ROOM AUDIO QUALITY AVOID LAPEL MICROPHONES INDEPENDENT AUDIO CONFERENCE SYSTEM THIRD LOCATION REMOTE AUDIO
TEST EQUIPMENT	CAPABLE OF MONITORING VIDEO AND AUDIO SIGNAL LEVEL GENERATE OWN COLOUR BARS PERFORM SIMPLE CHECKS, LOOP BACKS SEPARATELY AND WITH BELL TVOC EASY TO OPERATE
COST	PURCHASE AND OPERATING EXPENSE--MINIMUM

Other Requirements:

As the project development continued, it became apparent other requirements would be necessary. Slide presentations were required to enhance meetings and it was decided to use a 35 mm rear view slide projector portrayed on another 1.2 m screen. A camera positioned at the opposite end of the room from the main conference camera would be used to capture slide information and transmit it to the remote location. Switching from one camera to another would be done at the control panel. Also, rather than use an electronic blackboard, a white board would be installed for the purpose of handwritten requirements and overhead presentations.

A further consideration was a separate audio function to allow participants to conduct an 'audio only' conference. This feature would also act as an audio backup during a video conference should the audio po: tion fail.

A third consideration was to 'add-on' the audio portion only of a video conference to a third location.

With these additional requirements, the planned video equipment was becoming more complex and challenging.

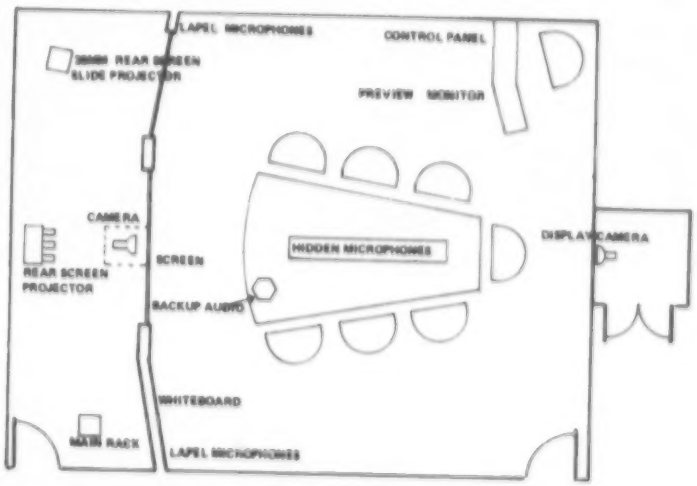
Perspective

As stated, our goal was to provide a 'very good' video teleconferencing system between Montreal and Toronto and avoid any noticeable switching of audio, normally associated with telephone speaker equipment. Ease of operation was a priority to avoid the need of a technician or attendant. Adcom electronics were arranging to have the sound equipment built. The T.V. projector, manufactured by Aquastar, is high quality equipment capable of providing an image approximately 6 m by 4.2 m depending on its distance from the screen.

Two JVC colour cameras would be used in each room. The control panel for camera switching, pan and tilt, and overall equipment control was designed by Adcom Electronics.

Room Schematic

ROYAL BANK OF CANADA STUDIO



PICTURE QUALITY -- Initially it was not very satisfactory. After determining that the cameras and projectors were not at fault, it was decided that the problem rested with the fluorescent lighting design. Light was not evenly dispersed at the minimum requirement on the subjects, and when the camera was focused at its greatest distance, the screen image was dark and shaded. Ideally, each participant required a minimum of 45 m candles of light. Our lighting design, while concentrating on the table and participants, did not spread the light over a wide enough area. Light measurement showed foot candles ranged from a low of 25 m at chair positions, to 30 m candles at the table edge to 35 m candles in the table centre. Also, the cloth material covering the microphone proved to be too light in colour. This also caused the cameras to average the light intensity at a high level and close down the iris. We changed the acoustic fabric to a darker colour and installed a wider bank of fluorescent lighting. Picture quality improved but we still experienced a shading problem on the screen, caused by the blue light tube of the projector.

To disperse the colour more evenly across the screen, glass wedges were installed on the blue and red tubes. These wedges reduced the shading problem considerably.

AUDIO -- We knew lapel microphones would provide the quality and sound desired, but did not wish the participants to feel 'tied' to the conference table. We also wanted to avoid the noticeable switching function which accompanies most telephone conferencing equipment. The trick was to provide open microphones in the same rooms as two ten-Watt speakers, yet avoid oscillation. When the rooms were swept for audio there existed some peaks and valleys in the acoustic levels. To overcome this problem we had to upgrade the equalizer. Five AKG microphones were installed at each location. These microphones were sensitive and their acoustic qualities caused a voice echo which was distracting to the conferees. This also meant the system was bordering on and at times tended to go into slight oscillation.

We replaced four microphones at each location with two self cancelling AKG studio quality microphones. At the same time 5 Hz shifters were installed to alter the frequency and prevent oscillation.

The separate audio conferencing feature linked through the telephone for audio backup purposes experienced low volumes. The equipment was pre-adjusted to accept the high quality audio signal over the video transmission. The video - 'audio' was four wire quality. The audio on the telephone network was of two wire quality. This decibel loss required audio adjustments at the main equipment rack and we did not want an attendant to have to fine tune the audio each time the medium requirement changed.

The first difficulty was overcome by balancing the audio between the two rooms and installing a remote volume switch at each control panel. Now participants could adjust the volume to their preference.

Recently, redesigned audio boards in the switching gear have enhanced the third location audio greatly and is currently undergoing acceptance testing.

REAR PROJECTION SLIDES -- Initially, our main difficulty was that the projector produced a bright spot from its lamp in the centre of the screen. While not noticeable to the eye, camera sensitivity picked it up. Also, graphics had to be compacted to the centre of the slide since information at the edges of the screen tended to disappear during transmission. We changed the projector lens which dispersed the light more evenly over the screen and this improved the quality of reproduction during transmission.

WHITE BOARD -- Overhead presentations were not as effective as desired on the whiteboard because of the reflected light intensity. However, hand written information is very effective, provided red or black markers are used. A blue marker is not recognized by the colour equipment during transmission.

CORPORATE IMPACT -- At the beginning of this presentation I commented that it is very difficult to tangibly cost-justify video teleconferencing. Since the implementation of our system, participants are now able to arrange their time more productively. The availability of this device is drawing remote functions in the bank closer together. It has not

eliminated travel, but has reduced this need considerably. As a matter of interest, we are presently averaging approximately 35 hours of airtime per month.

Participants appear very relaxed during these conferences and I would like to quote from an article in Fortune Magazine dated May 2, 1983 which outlines this fact.

The general response among folks has been favourable, often very favourable. Allan R. Taylor, president-designate of the Royal Bank of Canada, reports, "You don't really think of the other people as being at a distance. The other day I had a telephone call from one of our people who had been on the other side of the table in an audio-video meeting that morning. I asked him to come into my office for a couple of minutes, and he said, 'How can I do that? I'm in Toronto.'" .

Summary

We feel we achieved our goal of providing a very good video facility at reasonable cost. As this field continues to change, offerings and flexibility of video equipment will also continue to be enhanced. Your company's needs will determine your potential purchase and operating costs for a video teleconferencing system.

BUSINESS GRAPHICS

Jeff Potter
AVCOR

Graphics go a long way back, thousands of years -- cave drawing, symbology, hieroglyphics -- and they have become the universal methods of telling stories. Writing, or script, was developed primarily for efficiently recording and storing information, NOT communicating. Graphics, in their purest sense, refine intent and expression and, although the message may be absorbed in less time than the written word by the viewer, the message is not diminished: more often than not, it is enhanced. Graphics must have a reason to be created. Properly designed graphics act as a sieve, filtering out unnecessary or superfluous information.

There's a revolution happening. Graphics are now moving through to third and fourth waves, out of the traditionally perceived boundaries of paper and ink into the electronic age, giving us the means to communicate more effectively than in the past. As a matter of opinion, I believe that we, as a species that communicates more than any other, and have come to depend upon that for survival, have accepted conditioning of extreme limitations. We write and speak to various degrees of effectiveness; but we're not using an inherently natural ability to communicate graphically, although we've always been able to respond to graphics.

Symbols mean a great deal to us. They motivate us. They tell us where to go. What to do. When. Why. Colour affects our emotions. This technological revolution is breaking graphics from paper, and is now allowing us to span languages, culture, intellect, age, skill sets, and mind sets. Technology is even using graphics to overcome our fear of technology, as in the use of symbols and icons on a touch screen, rather than keyboards, for a computer. No longer do you have to be a computer whiz to access data-base information. You don't have to be a typist to talk to a computer. You don't have to be an engineer, a programmer, or an artist to create and manipulate graphics, or graphic information. Computers, copiers, autos, tools, toys, and traffic, are all becoming interactive communicators through graphics, more and more every day. So it is important to encourage skills development of graphic thinking in business. With the wave of electronic technology crashing through industry and business boardrooms, it is coming to the point where the majority of all decision-making information is graphic. We need to become familiar with the range of techniques and technologies available and their respective capabilities and limitations.

Some techniques and technologies will influence how graphics are to be treated and created. However, the need should be defined first. Know your communications objective clearly. Ask yourself what you want the audience to think, feel, or do. That's the "action objective." For graphic support for the spoken word, live teleconferencing, or pre-produced presentations, prepare your material to maximize the quality of the medium used. Keep in mind that the image on the screen is the image of the presenter. Some topics lend themselves more to graphic interpretation than others. However, even subjects with no apparent illustrative content would not be delivered unless there was some communications objective. Any delivery can be distilled down from the spoken word and presented, with key words step by step, in point form to take your audience through logical progression to conclusion.

There are good and poor images, charts, and schematics. There are also degrees of content that are not necessary. We've all probably seen speaker support that is virtually the entire script on the screen. The role of graphic communication within an organization should be set out in the same manner, with the same guidelines as any corporate policy. It is here that good graphics step out of personal aesthetics and into practical, efficient, effective standards that should be met to assure consistent communications.

For years now, companies have been using computers to store information. That aspect of computer technology has grown at a far greater rate than our ability to access it. But worse, when that information is required, the process to acquire it, and traditional method of presentation, has been vast listings of alpha-numeric and tabular data on forests of paper, requiring large quantities of time to distill down to a final format suitable for presentation. This usually results in stale information fraught with errors or inaccuracies. There are solutions presenting themselves. Computer programs, using graphics software to call information from a database, with preformatted charts and graphs are able to give output into film, hardcopy, or video. But this arrives at the point where effective graphics must be tailored to the user's needs.

Is tabular format good enough? Should line graph, bar chart, or area graph be used? Who cares about colour? Colour is important, if used for no other practical purpose than to add life to a visual. Poor graphics make even the best presenter look bad. So, strike standards; standards that will govern format, materials used, production processors, and colour codes based on chosen and proven mediums. Publish them. Make them laws that will evoke the highest visual standards that your organization or department, or YOU will be communicating with and remembered by.

So, in summary, for a general approach to graphics:

1) choose to use graphics;
2) choose the medium;
3) design to your needs; and
4) set the standards.

AUDIO BRIDGING

Jerome Powers
President
Darome Inc.

Welcome to the revolution... the revolution in the world of business meetings. That revolution has created a need-driven technology for teleconferencing bridging systems.

More and more, people are realizing that they can deal with a surprising number of business matters by getting together to talk about them in a teleconference instead of getting together in person. Some 40% of all meetings could be done via teleconference. People are discovering that the teleconference is a great way to have a meeting of the minds, while the body stays where it is.

The tight economy, the need for increased p tivity, the stresses and strains of travel, escalating business cost l are making teleconferencing an important adjunct to face-to-face meetings. And in many cases it is proving to be not only an adjunct but an excellent substitute for being there. Because whoever said getting there is half the fun was never stranded in an airport on a Friday night.

I want to demonstrate for you today how Darome's end point bridge works. This bridging equipment, the Darome Co-Convener Meet-Me Bridge, is the basis of our conferencing service, the Darome Connection, which is an operator-assisted network for multi-point conferencing. So for this demonstration we will join with some of our people in Chicago and in Minneapolis by teleconference to show you the service in operation.

Our major objective in designing the bridging device that makes the service possible was to make the telephone connection for more than two lines identical in quality and performance to a simple phone call. To accomplish this objective we had four important considerations.

They were:

1) the system should have a dial-in, dial-out "meet-me" capability;

2) it should compensate for the built-in transmission loss of the phone system from the calling to the receiving station;

3) it should eliminate echo return caused by signal bounce from the telephone network; and,

4) it should control collective noise -- both acoustical and transmission noise.

Once we had the system designed that met those four specifications, we knew we had half the job done. The other half -- and of equal importance -- was to develop a staff of trained operators to act as conference managers.

The key to the success of multi-location, large scale conferences is skilled conference management. I cannot emphasize this too strongly. In fact, I'll repeat it. The success of the conference depends on the operator.

We train our Darome operators to be as alert as a sargeant-at-arms, as decisive as an air-traffic controller, as diplomatic and reserved as an English butler, as direct as a traffic cop and as nimble fingered as a harpist.

If you do not have such a paragon of conference management standing by and at the ready to serve your multi-location conference, you are courting disaster. And disaster surely will strike because of the nature of the telephone system. The odds are against you. There's a very good chance one or two of your participants will vanish sometime during the meeting. And without a conference operator, they'd never be heard from again.

By AT&T's own figures the possibility is 100% that a phone line will drop off during a 1-1/2 hour, 20 location conference. So you need to have an operator in attendance to take care of that eventuality.

When it does happen the operator will either call the 'lost' participant or will wait for the participant to call back. Then the operator puts the missing party back into the meeting and there's no disruption to the rest of the group.

Customarily, at the beginning of the meeting, when the conferees are all on-line, the conference operator does a roll call to check the quality of the lines and to give each location a chance to respond. The roll call lets all the participants know who is present in the meeting and where they are.

Teleconferencing is most useful when it is a flexible medium of communication. People who use it often insist it be convenient. They want to be able to participate in the meeting no matter where they are -- whether they are at division headquarters, out in the field, home in bed with the flu or at the airport on their way to Ottawa. They want to have access to the system from any location where there is a phone.

In addition, sometimes they will want to bring someone into the meeting after it has begun or to excuse some of the people when the remainder of the meeting involves only a few of the participants.

That's another instance when the conference manager and the call-in, call-out capability play such an important role.

The Darome Connection telephone conference service provides both the bridging systems and the conference management. Presently there are Darome Connection facilities in Chicago, Ill., Danbury, Conn., and Savage, Minn., a suburb of Minneapolis.

The bridges work with standard telephone business lines. To compensate for the built-in transmission loss of the phone system from the calling to the receiving location, the bridging system must distribute the signal as if it originates at the bridge. This means it must re-establish the gain to compensate for the designed-in loss of the telephone system.

The next important consideration in the design of the Darome end-point bridge was the echo that can build up from the telephone system and the echo within the bridge itself. The signal reflected from all participant lines cannot be allowed to enter the bridge and accumulate. That collective echo would result in an unstable or 'singing' bridge. If the echo return is not controlled, large numbers of phone lines cannot be tied together. And based on our customers, we know there is a definite need to tie many together.

The Darome Connection is frequently expected to provide for conferences that have 40 to 60 participating locations. Our biggest conference to date involved 130 locations. Last week a customer had a 104 line conference among 14,000 employees in 29 states; it was an airline and the meeting was just a week in the planning.

We opened our Minnesota service facility this June, and moved our Danbury operation to larger quarters. Danbury will have an additional 20-line capability in September, raising our entire network capacity to accommodate 280 calling locations.

For purposes of bridging, talker echo is of primary concern. Controlling the echo and simultaneously amplifying speech ensures that all participants sound the same regardless of the distance or type of terminal equipment they are using -- be it a speakerphone, a portable Darome Convener or a permanently installed conference room system.

Another factor that bears on the echo consideration is the pattern of use when large numbers of locations are participating in the conference. Because of echo build-up, full duplex bridging with amplification is not possible for multi-location conferences.

To prevent the echo build-up, we designed a voice-switched system so that the bridge acts like another telephone. In essence, the bridge is always listening to just one person or location while relaying that speech to the conference participants. The voice-switched simplex mode of operation ensures that there is only one talker at any given time. The bridge accomplishes this through its logic system and there is virtually no echo.

Another benefit of this voice-switched simplex approach is it minimizes noise build-up on a conference. The maximum noise any listener hears is the noise of the telephone line from the bridge to his location plus the noise on the talker's line arriving at the bridge.

In effect, the bridge serves as a noise collector and disposal unit. But it also has help from the ever vigilant conference manager. The operator stands by to keep a check on the technical quality of the meeting. If one of the conferee's phone lines becomes noisy or deteriorates the operator pulls that person out of the conference and asks him to dial in again. Generally the new line will be a better one, free of static and feedback.

Other noise can be controlled by the sensitivity threshold that the bridge is allowed to have toward the line. Darome operators decide whether or not to change the sensitivity threshold to pick up the talker.